VOL. 9
NO. 4

APRIL • 1941

THE REFRIGERATION SERVICE ENGINEER. Nickerson & Collins Co., Publishers. 433 N. Waller Ave., Chicago, Ill. Published monthly. Vol. 9, No. 4. April, 1941. Entered as second class matter March 4, 1938, Chicago, Ill., under the Act of March 3, 1879. Subscription in United States, $2.00 per year; all other countries, $3.00 per year.

The Refrigeration Service Engineer

Vol. 9 No. 4

April, 1941

A Monthly Illustrated Journal Devoted to the Interests of the Refrigeration Service Engineer in the Servicing of Domestic and Small Commercial Refrigeration Systems and Oil Burners

Official Organ
REFRIGERATION SERVICE ENGINEERS SOCIETY

COVER

Engineer checks performance of one of the York "V/W" Compressors which provide refrigeration for air conditioning in the offices of United Benefit Life Insurance Co., Omaha.

Published by
Nickerson & Collins Co.
433-435 North Waller Ave.
Chicago
Telephones Austin 1303-1304-1305

EASTERN OFFICE
420 Lexington Ave., New York City
Telephone Lexington 2-4816

Publishers of Technical Books and Trade Journals Serving the Refrigeration Industries for 50 years.

Subscription Rates United States $2.00 per year. Single copies 25c. All other countries $3.00 per year.

TABLE OF CONTENTS

The Refrigeration Service Engineer

Vol. 9, No. 4 CHICAGO, APRIL, 1941 $2.00 Per Annum

Cold Plates and Their Application to Trucks and Locker Plants

Two Interesting Examples of Application Engineering Where Cold Plates Are Specified

By A. F. SAWYER*

COLD plates may be roughly grouped in two types, one of which is the cold plate without any holdover solution, and the other a cold plate with varying amounts of eutectic solution to provide a certain amount of holdover capacity which will provide refrigeration during the shut-down period of the compressor.

In general, the plain cold plate comprises two outer sheets of metal in between which a refrigerant circuit is provided, either by pressing the metal sheets so as to form refrigerant passages between them, placing pipe or tubing between the sheets or placing metal strips between the sheets to define the refrigerant circuit.

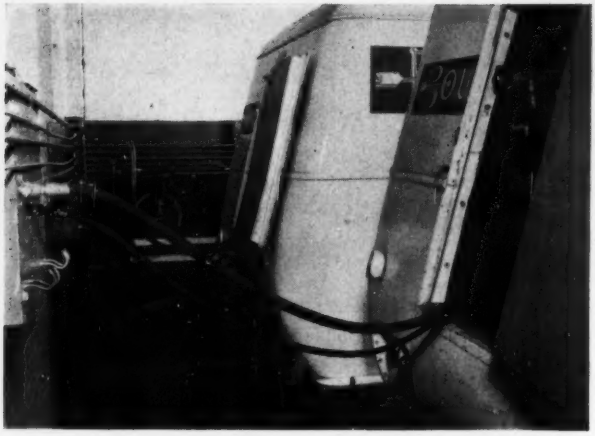
The type plate employing pipe between the two sheets is further known as the vacuum plate, because a vacuum drawn on the spaces between the sheets serves as a means of collapsing the plates against the pipe coils and keeping contact between the plates and the coils.

Vacuum plates are made of 16 and 18-gauge steel, fabricated into a tank between 5/8 inch and 2 5/8 inches thick, with lengths and widths to fit the particular job. The plate is seam-welded at the edges to give a hermetically sealed compartment. In this compartment are steel pipe coils, and if the plate is 3/4 inch or 7/8 inch thick, the coils lay flat against the sides of the plate. A vacuum is then drawn on the plate and the sides are forced against the coil by atmospheric pressure. This pressure assures practically 100% contact between the coil and plate.

If holdover is required, the space around the coils is about 9/10 filled with eutectic solution. A eutectic plate of this type has sufficient capacity for many uses, but certain applications like meat and ice cream trucks will require more holdover capacity. To gain this, thicker plates are constructed. The coil is now laid against one side of the plate, and spacers are placed between the coil and other side of the plate. The spacers take the atmosphere pressure load, allowing the plate to retain its shape and also to give the desired holdover space.

We will consider eutectic-filled vacuum plates, as applied to truck bodies. They are made in a wide range of standard sizes so as to fit practically any type of body. They

* Dole Refrigerating Co., Chicago, Ill. Presented before the 2nd annual convention sponsored by Ontario Maple Leaf chapter R. S. E. S.



Here is a recent installation made for the Bowman Dairy Co. in Chicago. Eutectic plates are used in the trucks. Individual condensing units are installed in the garage and connected by means of flexible hose connections to the trucks over night. One of the condensing units may be seen in the background, and the valves and hose connections in the foreground.

employ different eutectic brines, having a eutectic point suitable for the work the plates are to do. There are available a variety of eutectic brines, the most common in use having eutectic points of approximately —6°, 0°, plus 18° and plus 26°. It is generally possible with this range of eutectics to maintain body temperatures for practically any purpose between —15° and 50°.

The value of holdover plates as a refrigeration medium is in the latent heat values of the eutectic solution when frozen. The heat absorption being approximately 106 B.t.u.'s per pound of eutectic for —6° or plus 18° brines. In normal usage a —6° brine holdover plate is termed a low temperature plate, while a plus 18° plate is termed a high temperature plate.

There is no difference in the construction of high and low temperature plates. The solidification point of the eutectic is the only change.

In figuring the refrigeration load for holdover plates, two factors must be considered; first, the necessary amount of plate surface must be used to offset the heat leakage and service load; secondly, it is necessary to have sufficient holdover solution to absorb the heat gained in the number of hours the truck is on the route, or the length of time holdover is desired.

In general, there are two methods of freezing the eutectic solution. One system is called the remote system, where the plates are connected to a central plant system, or to a remote compressor located in a convenient place. The remote connection is made with flexible lines especially adapted for connecting the plates to central refrigeration plants.

The other method is to install the condensing unit directly on the truck body, making permanent connections to the plates. Power for operating the compressor can be an electric or gasoline motor, depending on the circumstances. For an example of figuring a low temperature truck body, we will assume the following:

The truck dimensions—120 inches long, 60 inches wide and 72 inches high.
Cork insulation—8 inches on roof, 8 inches on side walls and floor.
Body temperature—0 degrees.
Product—ice cream delivery.
Average door service.
Maximum outside temperature—95° F. Night temperature, 80°.
12-hour holdover desired.

Heat Gain Calculations

Outside wall and floor surface 300 sq. ft. × .05 × 95° equals.....1425
Outside roof 66 sq. ft. × .087 × 95° equals 232

Hourly heat leakage.....1657
Product load—ice cream at 10° to 0° no load .....
Service load—50% of hourly load..... 828

B.t.u. hourly 2485
Assume 15° temperature difference between plate and truck body.
K factor of holdover plates = 2.0.

Square foot of plate surface required = $\frac{2485}{15 \times 2.0}$ equals 83 sq. ft. of plate surface required. (Both sides of plate effective.)

Holdover required—2485 B.t.u. per hour × 12 hours = 29,800 B.t.u. needed, or 281 lbs. of holdover figured at 106 B.t.u. per lb.

Standard plates are then chosen to meet these conditions as closely as possible.

Method of Figuring Compressor Load

Heat load absorbed by the holdover plates during the day, 12 hrs.....	29,800
Night leakage load at 80° for 12 hrs. approx.	17,000
Total B.t.u. load.....	46,800

In arriving at compressor size, the capacity should be sufficient to freeze the eutectic in 8 to 10 hours as a safety factor.

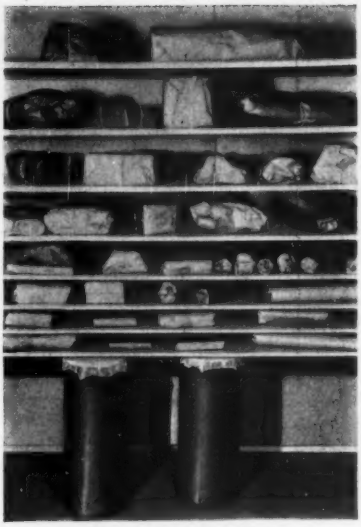
In this case the compressor rating should be approximately 6,000 B.t.u. per hour at —20° gas.

Locker Plants

Another large field for vacuum plates is in the locker plant industry. The usual set-up consists of four sections. A chill room to cool fresh-killed stock, fruits or vegetables; a processing room for cutting and wrapping; a quick freeze cabinet or room where the wrapped products are quick frozen; a locker room where the frozen package goods are stored. All except the processing room are refrigerated, although occasionally, processing is done in the chill room.

The chill room is usually held at 36° to 38° by means of vacuum plates overhead or other means. Proper cooling surface and temperature must be maintained to give desired humidity or products will dry out rapidly.

When the product is ready for freezing, it is placed on the freezer plates held at —20° in the freezer room or cabinet. The freezer room is usually built into one corner of the locker room as a cabinet of three pieces, front, side and top. Depending on size, the front will have one or two doors for reach-in service. Inside the freezer cabinet are four to ten plates 22 inches wide and four to nine feet long. These are usually mounted on a freezer plate stand of angle iron, with plates at various spacings of three to eight inches. It will be found more convenient to use the three inch spacing at about shoulder height for easier reach-in.



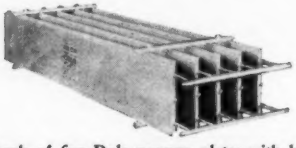
Sharp Freeze Room

Freezer plates are always connected in series, but no more than 75 sq. ft. of plate surface (figuring both sides) should be used to one expansion valve when Freon or methyl gas is used. With ammonia, 150 sq. ft. of plate (both sides) may be used. The expansion valve may be connected to the bottom or top plate; bottom expansion flooding the plates a little better and cooling lower plates more rapidly, and top expansion giving more even temperature from top to bottom. If products are of standard thickness, plate spacing can be arranged for packages to fit snugly between plates, providing the most rapid freezing.

To figure the area of fast freeze plate needed, we allow seven to nine lbs. of meat per day per square foot of plate. Since the average 300 locker plant will turn over two pounds of product per locker or 600 lbs. of product per day, we divide 600 by 9 to obtain 66 sq. ft. of plate surface (one side) or six 22 x 72 inch plates. Two thermostatic valves would be used for these.

After freezing, the product is removed from the plates and stored in lockers in the locker room. Lockers vary in size, one common size being 18 inches wide, 18 inches high and 30 inches long. They are usually built up five tiers high, depending on room height, the lower locker being a drawer type for easier accessibility.

Locker plates 12 inches wide and 72 inches to 144 inches long are made up in banks of four to six plates with hangers. They are suspended by ½ inch iron rods from the ceiling and located over the aisles. The plates in each bank may be connected in series or with the header in parallel. If in series, no more than four 144 inch plates (96 sq. ft.) can be used to one valve. However, six 144 inch plates may be used with header type since the pressure drop is low. In either case, the B.t.u. rating of the valve should be somewhat in excess of the plate requirements. Too small an orifice will not pass sufficient gas and too large an orifice will cause surging, that is, the valve will over-feed the plates, frosting back to the compressor. The valve will then close entirely, thus starving the plates for a period.



A bank of five Dole vacuum plates with headers and hangers as used in locker plants and other such applications.

Overhead banks of plates should be set up horizontally, checking with a spirit level both ways. Plates should show even frosting in operation. With a header hook-up, if the plate nearest the expansion valve should not show even frost line, lower the bank about ⅜ inch on that side.

Overhead locker plates and quick freeze plate shelves are usually finished with aluminum paint, since no rusting will occur at the zero temperatures. Plates used in the chill room at defrosting temperatures should be ordered with zinc finish for rust prevention.

Refrigerant Lines

The return line should be large enough to prevent pressure drop, probably 1⅛ inch o.d. for a 3-h.p. compressor and 1⅜ inch for 5-h.p. On leaving the manifold, use a six inch riser, or slope tubing upwards to allow flooding of plates. Arrange returns so flooding of one set of plates will not allow liquid to run back in the line and affect the thermostatic valve bulb on another set of plates.

With Freon or methyl, use ⅜ inch liquid lines to expansion valves, and it is convenient to have hand valves ahead of each expansion valve.

Accessories

A heat exchanger should be used with Freon or methyl, installed just outside the locker room. It can save 10% on the electric bill and prevents slugging back to the compressor. A sight glass in the liquid line is recommended.

A good sized dehydrator should be used in the liquid line. An oil separator may improve operation on some jobs. Oil troubles have been serious in the past, logging the plates and damaging compressors through lack of oil. However, it has been shown that this has been largely due to operating the system with valves not open enough. Sufficient liquid refrigerant in the plates is necessary to wash the oil back to the return line for return to the crankcase. Do not be misled by light frost on the return when adjusting the valve. Hold your hand on the return line to warm up the tubing. If frost melts off, it indicates no liquid. If ice coating cannot be melted off, liquid is shown. If these conditions alternate, showing slight surging, valve setting is about right.

Condensing Units

A separate compressor is recommended for the chill room since the gas temperature required is about 20°. Often a ½-h.p. compressor will take care of the chill room, whereas, if one large compressor is used for the whole plant, one horsepower additional in size is required. Current costs will then be greater with the latter. A constant pressure valve and check valve are needed for this layout.

Since new compressors are shipped with only a small holding charge, it will be necessary to add refrigerant to take care of all plates and lines. The oil level in the crank case should be checked after the first day, at the end of the first week and monthly thereafter. Use only high grade oil specified for the particular refrigerant and —20° cold test or lower.

Controls

It is usual to control the compressor by back pressure switch; for Freon and depending on conditions, cut in at about 12 lbs. and cut out at two. When one compressor is operating the locker room and freezer plates this takes care of usual operation. However, in cold weather when there is not much load on the locker room, but considerable fast freeze work to be done, the compressor may not operate enough for rapid freezing and continued cooling of overhead

A view of the locker room showing the banks of overhead plates installed in the passages between rows of lockers. Note the sharp freezer cabinet at the lower left corner with lockers above and to one side of it.

plates is unnecessary. To take care of this situation, a solenoid valve in the liquid line to the locker room is recommended, controlled by a room thermostat. This allows the overhead plates in the locker room to pump out so the receiver is well supplied with liquid. If heavy freezer loads are anticipated such as loading several of the plates at once, the back pressure may rise above 10 lbs. and it will be necessary to have a check valve in the return from overhead plates to prevent condensation and loading of plates with liquid.

Insulation

It is assumed the plant will be laid out by competent engineers thoroughly familiar with locker plants. It must be convenient to work in, economical to operate and stand up for many years. To insure being economical and durable use only good insulation installed correctly. For low temperature rooms it must be at least 6 inches to 10 inches thick, depending on material used, and all walls, floor and ceiling should be moisture-proof and vapor sealed on the outer side of the insulation. This is highly important as any moisture or air leaking in will cause condensation in the walls. The inner walls need not be vapor tight, a slight amount of breathing being an advantage in keeping insulation dry.

Figuring Locker Plants

To illustrate the method of figuring a 300 locker plant, we assume temperatures of 90° outside and 5° inside. If 8 inch insulation is used, the outer area will be 1810 sq. ft. Multiplying this by .9 (K factor for 8 inches on 24-hour basis) and 85° (temperature difference), we get a wall loss of 138,000 B.t.u. per 24 hours. Adding 20% for service load, the result is 166,000 B.t.u.

To determine overhead plates necessary we assume a K factor of two for plates (on hourly basis) x 16° (temperature difference between air and plates) giving a result of 32 which is B.t.u. removed by each square

foot of plate per hour. Since we expect to operate the compressor 18 hours a day during warmest weather we have 32 x 18 or a factor of 576.

The total load of 166,000 B.t.u. divided by 576 gives a result of 288 sq. ft. of plate necessary. Each 12 x 144 inch plate has 24 sq. ft. of surface so 12 will be required, in three banks of four plates each.

Using two pounds of meat per locker per day as an average, we estimate 616 lbs. of meat per day. To figure freezer plate surface required we divide 616 by 9 and obtain 68.5 sq. ft. one side. We would probably use six 22 x 72 inch plates. The meat freezing load on plates is about 12,000 B.t.u. per 100 lbs., so 74,000 B.t.u. gives a result of 240,000 B.t.u. total for 24 hrs. Since the compressor must produce this in 18 hrs. we divide 240,000 B.t.u. by 18 to get 13,300 B.t.u. per hour.

The plate temperature needed is —11° to obtain 16° t.d. between plates and room, but since there is about a three pound pressure drop through the plates and return line, or 6° gas temperature difference, the compressor will operate on —17° gas.

Looking at manufacturers' tables we find a Freon 3-h.p. compressor operating at —17° gas, rated at 14,200 B.t.u. per hour when using 80° condensing water. Thus for conditions above, it will be large enough for the freezer and locker room.

The Chill Room

The chill room is figured on the same principle as the locker room. Assuming four inches of insulation and one wall against the locker room with no heat loss, the total wall loss with the service factor is about 78,000 B.t.u. per 24 hours. We then allow about 3,900 B.t.u. per 100 lbs. of meat to be chilled or about 24,000 B.t.u. per day for cooling warm meat 90° to 36°. This added to 78,000 B.t.u. gives 102,000 B.t.u. To find the plate surface necessary we use a 2.5 K factor (for air above 20° use 2.5) x 16° t.d. giving a result of 40, which is B.t.u. removed by each square foot of plate per hour. Operating the compressor 18 hours a day, the factor is then 40 x 18 or 720. The load of 102,000 B.t.u. divided by 720 gives 142 sq. ft. of plate needed. Accordingly six 12 x 144 inch plates are selected. If a separate compressor is used on the chill room the load of 102,000 B.t.u. for 24 hours is divided by 18 to obtain an hourly load of 5660 B.t.u. at 20°. This is just over the capacity of most ½-h.p. condensing units so a ¾-h.p. will probably be required. To get a perfectly balanced job a slightly smaller pulley may be used on the motor giving the effect of a ⅝-h.p. motor. The idea is to keep the gas temperature in the plates not more than 16° below room temperature, otherwise the relative humidity of air may be low and dry out the food products in the room.

Operating on One Compressor

If the plant is to operate by one compressor we add the 16,000 B.t.u. per hour necessary for the locker room and freezer, and the 5650 B.t.u. per hour for the chill room and obtain 21,650 B.t.u. per hour required. We then find a 5-h.p. compressor of about 23,000 B.t.u. per hour at —17° gas under manufacturers rating tables will be required.

There are many factors to be considered for correct design, only a few of which can be discussed here. The method of figuring given is rather general, omitting some details. For instance, a heavy sun load may require two inches extra insulation on exposed surfaces. If outside temperatures above 90° are anticipated, or if 0° is to be the locker room temperature, it may be necessary to use heavier insulation. Bear in mind also that compressors may become less efficient after a period of time, resulting in longer running time of the compressor. Since water cooled compressors are usually used, the temperature of available condenser water in mid-summer is important in selecting compressor size. Power bills are considerably higher if 90° water must be used instead of 70°.

Locker Room Engineering Data

A locker plant averages two pounds of meat per locker per day. The product load on the chill room is about 3900 B.t.u. per 100 lbs. of meat per day, cooling from 90° to 36°.

The product load on quick freeze plates is about 11,900 B.t.u. per 100 lbs. of meat per day, cooling from 45° to —10°.

The quick freeze plates will freeze about 7 to 9 lbs. of meat per square foot per day.

The K factor of vacuum plates at about 0° temperature is two. (B.t.u. per sq. ft. per degree temperature difference per hour.)

The K factor of vacuum plates at 20° or above is 2.5.

Problems of Refrigerant Distribution Through Multi-Circuit Coils

By A. B. SCHELLENBERG*

THE problem of distributing refrigerant to parallel circuits in a low side evaporator is one of increasing importance and bother to the installation and service man. It is the purpose of this paper to discuss the problem of distribution; the existing distributing devices; means of recognizing distribution troubles; and some methods of correcting distribution trouble.

This subject probably may best be introduced by describing a particular trouble installation. A manufacturer fabricated a long series spiral coil which was immersed in a water tank and was to cool water for process work. As much copper tubing was wound into a coil as the tank would accommodate and it was connected to a Methyl Chloride compressor. When the system was placed in operation, it was discovered that the end of the coil was icing up and the water was freezing around it even though the temperature of possibly the first 80 per cent of the coil was above freezing. The installation man opened up the expansion valve in an effort to raise the suction pressure and, therefore, the refrigerant temperature, enough to prevent this freezing. When this was done, however, the refrigerant temperature in the first part of the coil was so high, and the temperature difference reduced to such an extent, that the coil would not produce the desired capacity. Obviously, there was so much coil in series that there was a tremendous pressure drop through it which caused the troubles just described.

The solution to this problem was, of course, to break up the coil into several parallel circuits so that this pressure drop could be reduced and the coil operated at a refrigerant temperature just a few degrees above 32 throughout its entire length. The coil was broken up into three parallel circuits fed by a header, which in turn was fed by a single thermostatic expansion valve. The system was again started up, and again it did not operate satisfactorily, for the suction pressure was still too low and the unit would not produce the rated capacity.

Checking the operation of the coil, it was soon discovered that the refrigerant was not being distributed evenly to the three parallel circuits. The refrigerant was short circuiting through one circuit, and the suction gas from this circuit, which had a low superheat, was affecting the thermo valve remote bulb and throttling the valve before sufficient refrigerant was fed to the other two circuits.

Pressure Drop Problem

Here, of course, was a problem of poor distribution, and the only solution to this problem was to either change the distributor header so that the distribution was improved, or to place an expansion valve on each circuit which would control and feed it separately.

This incident of the water coil is typical of what has taken place in the industry. Various factors introduced a pressure drop problem which had to be solved, and in solving it a new problem, that of distribution, was encountered.

The use of refrigerants which require the circulation of relatively large quantities of liquid per unit of refrigeration, and which have comparatively high percentages of flash gas, have introduced a pressure drop problem. It has also been necessary to eliminate long series coils, since in such coils the refrigerant velocity in the first portion of the circuit is reduced and, therefore, the efficiency of the coil is reduced since the scrubbing effect of the refrigerant is lost. On the inside walls of the tubing in a coil

*President, Alco Valve Co., St. Louis, Mo.

there is an accumulation of small bubbles of gas which have a tendency to reduce the efficiency of the tube surface. This is true since the heat transfer factor through gas is a great deal lower than through liquid. As the velocity of the refrigerant flowing through the tube is decreased, its ability to scrub off these gas bubbles is reduced.

It is, therefore, obvious that in order to eliminate the inefficiencies of high pressure drops and reduced velocities in low side evaporators, it is necessary to use a number of shorter parallel circuits.

The use of parallel circuit coils has introduced the problem of feeding refrigerant equally to each of these circuits so that maximum low side capacity may be realized. There are two general classes of distribution problems, the first dealing with unequally loaded parallel circuits, and the second dealing with equally loaded circuits. Coils in the first general class are extremely difficult to control and, therefore, are not generally used.

Unequally Loaded Circuits

There are only a few ways in which proper distribution of refrigerant can be accomplished on a coil with unequally loaded circuits.

On such a coil proper distribution could be accomplished by placing a thermostatic expansion valve on each circuit. This, obviously, is quite costly and increases the space requirement, and in addition provides a difficult adjusting and service problem. Therefore, most coil manufacturers strive to build up coils of equally loaded passes. Another means of feeding a coil with unequally loaded passes is to provide ample accumulator or surge drum capacity at the end of the coil, which will prevent the return of liquid to the compressor should it short circuit through one coil circuit. When an accumulator or surge drum is used between the coil and the compressor, one control valve, either a thermo valve or a float valve, may be used. In using the surge drum, you are merely making it possible to slop liquid over from the favored circuit to such an extent that the other circuits will also get sufficient liquid. There are a number of such parallel pass flooded installations in existence today, practically all of them on larger capacity compressors. Surge drums are costly, particularly on small installations, and they take up valuable space. Then, too, the amount of charge is materially increased in such systems, and this also becomes a cost item which must be considered.

For reasons of cost, space and usability, it, therefore, becomes desirable to use equally loaded passes fed by some form of distributor which, in theory at least, will feed refrigerant equally to each circuit.

Since a single control valve and a distributor header are most commonly used because of the reasons outlined above, it would be well to briefly discuss why distribution is a problem. As you well know, the expansion valve is a pressure reducing device, and as soon as the high pressure liquid refrigerant passes through it, the pressure is reduced and a large percentage of the liquid refrigerant flashes into a gas. In the case of Freon, for example, when the pressure is reduced from 100 lbs. head pressure to 40 lbs. suction pressure through the expansion valve, approximately 56 per cent by volume of the refrigerant leaving the valve is flash gas. This means that any distributing device must handle a mixture of gas and liquid.

In the dry expansion coil, the problem is to distribute the liquid refrigerant evenly through passages or orifices which, at the same time, must handle this flash gas. Such distribution is difficult because of the fact that after the liquid refrigerant pressure is reduced through the expansion valve, there is a separation of the flash gas and the liquid so that uneven mixtures of gas and liquid are present at the entrance to these passages or orifices. This problem of distribution can only be completely solved by metering the gas and liquid separately and accurately, or by distributing the refrigerant before separation of the flash gas and liquid takes place.

The problem of distribution with a flooded header is always difficult because there is nearly always a difference in the pressure drop across the various circuits, which is aggravated by the likelihood of unequal loading.

Types of Feed Headers

There are several general types of distributor headers in use today and there are, of course, a great many variations of these general types.

These distributing devices may be classified as follows:

1. *Gravity feed header:* This is a flooded type of header where an attempt is made to carry a head of liquid refrigerant over the various circuit inlets and where the feed to

the circuit is by gravity or static pressure. Fig. 1. On this type of distributor header the pressure drop through the circuits should be extremely low (well under one half pound) and, therefore, the circuits themselves must be very short. This is extremely

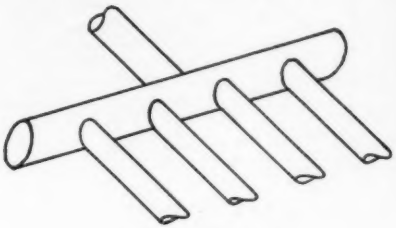


Fig. 1—Gravity Feed Header

important where the circuits are unequally loaded, such as on a forced draft cooler with horizontal air flow. This type of distributor header is for flooded operation only and, therefore, the initial charge of refrigerant is greater than on other systems and oil return problems are also introduced. The

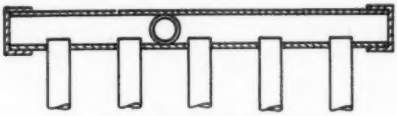


Fig. 2—Weir Type Header

fact that the circuits must be extremely short, with little or no pressure drop, is also a restriction on the use of this type of header.

2. *The Weir type distributor header:* In this type of header a baffle, or tube extension over which the liquids must flow, is inserted into the distributor header. Here the liquid refrigerant is permitted to separate from the gas and then spills over into each outlet tube. Fig. 2.

Generally, this type of distributor header is used only on flooded installations and has the same limitations as outlined under the gravity feed header. In a few instances this type of header has been used on a direct expansion system. When this type of header is used, it is highly important that it be perfectly level. If one end is higher than the other, more refrigerant will flow through the outlets in the lower end of the distributor header because of the presence of the tube extensions.

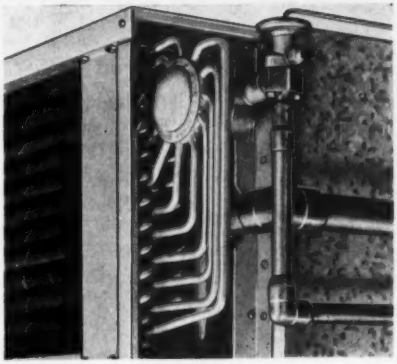


Fig. 3—Centrifugal Header

3. *Velocity or centrifugal header:* Here the distribution depends upon adequate velocity to supply the proper quantities of liquid to all outlets of the header. The refrigerant enters the distributor tangentially to give it a whirling motion. Fig. 3.

This header must be sized carefully for the normal load conditions, and this is sometimes difficult since a given size coil and header must be used on a wide range of load conditions.

4. *Orificing headers:* The orificing header

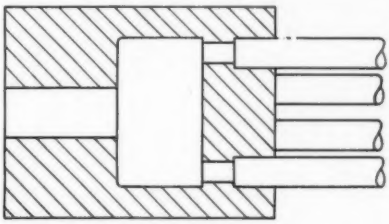


Fig. 4—Orificing Header

is one in which distribution is accomplished by a pressure drop through accurately sized orifices. A plate, or plug, through which a long orifice is drilled, is inserted ahead of the circuit inlets. Fig. 4. Here again the header, and more particularly the orifices, must be sized carefully for the normal load conditions. Here the problem of the separation of flash gas and liquid introduces real difficulties, because the flash gas increases as the load decreases since more of the expansion under these conditions takes place across the expansion valve. For this type of distributor header to work satisfac-

torily, adequate pressure drops must be maintained across the orifices feeding the various circuits.

This type of distributor header is widely used and is fairly satisfactory if the load does not vary too much. A popular form of the orifice distributor header is the widely used tube cluster. Fig. 5.

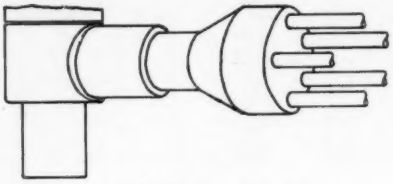


Fig. 5—Tube Cluster Orifice Header

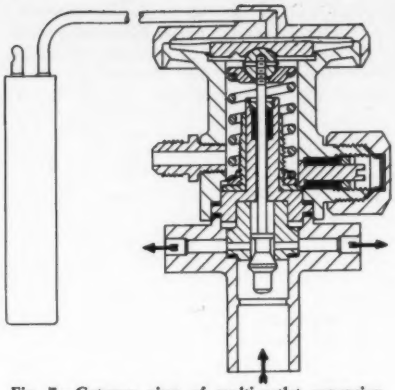


Fig. 7—Cutaway view of multi-outlet expansion valve

5. *The multi-outlet expansion valve:* The multi-outlet expansion valve is a combination expansion valve and distributor which eliminates the need for a separate distributor header. Fig. 6. This device has proven to be the most efficient distribution means as yet devised.

Fig. 7 shows a cross section of the multi-outlet expansion valve. Distribution takes place in the valve body, and only short lengths of tubing are required to connect the several outlets from the valve to the several circuits of the evaporator. Note that distribution takes place immediately at the point of pressure reduction before any separation of the gas and liquid can occur. Therefore, the feed to each of the several circuits of the evaporator is equal

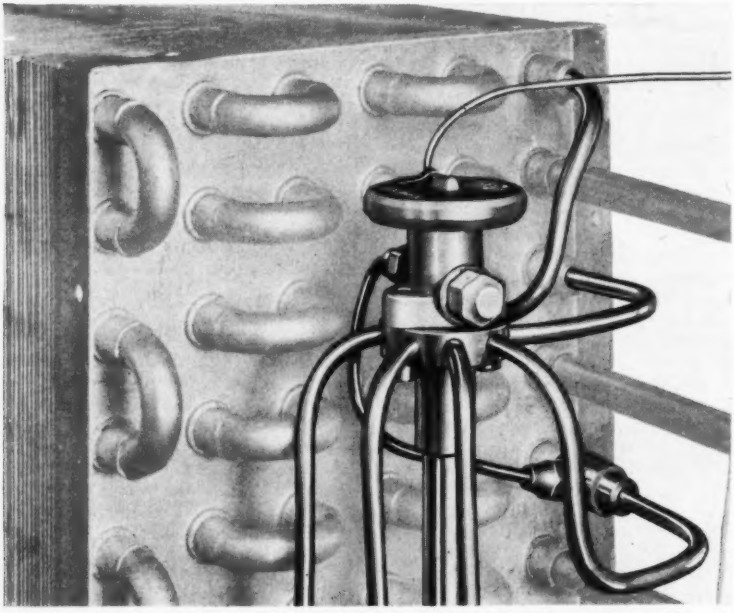


Fig. 6—The multi-outlet expansion valve which eliminates the need of a feed header

and direct. The distribution obtained by a multi-outlet valve is not affected by load changes, since the throttling action of the valve induced by load changes equally throttles the refrigerant flow to each circuit of the evaporator.

Aside from the distribution function which it performs, the multi-outlet thermo valve operates as any standard thermo valve. It is installed and adjusted like any other thermo valve. The distribution obtained from a multi-outlet thermo valve makes it possible to maintain a low superheat at the main suction outlet from the evaporator, and at the same time maintain a relatively high suction pressure. This is accomplished by being able to utilize the maximum amount of evaporator surface for the absorption of the heat load, rather than for the creation of superheat to vaporize excess liquid refrigerant brought in through a few circuits by improper distribution. Furthermore, the efficient distribution of the multi-outlet valve reduces the variations between temperatures at the outlet of the several evaporator circuits to a minimum.

(To be continued in the May issue)

Evaporative Condensers Becoming an Essential

By S. C. MONCHER

FOR THE majority of commercial refrigeration installations and for most small air conditioning systems, evaporative condensers or cooling towers are still a rarity. They are in the class of unessential extras which tend to raise the price of the installation, and consequently have been shunned by estimators and salesmen.

This situation is rapidly changing, however. City water mains were, for the most part, laid down over a quarter of a century ago, when the need for water to cool the condensers of refrigerating machines could not be visualized. The capacity of the water supply system was based on the probable maximum population of an area multiplied by 100 gallons per person. (In spite of the fact that each one of us would be willing to guarantee that he could not possibly use more than 10 gallons of water per day, the average municipality uses water at the rate of 100 gallons per inhabitant per day.) As the consumption of water rose with the growth of air conditioning and refrigeration, measures were enacted with a view towards conserving the water supply. Metering the water and raising its price have proved the two most effective measures. In some localities water today is now being sold by the city at a rate as high as $8 per 1000 cubic feet.

To make matters worse, a large section of the country periodically goes through a water shortage, which has given new impetus to the movement to cut down the consumption of water which is not used for drinking or personal hygiene. Take the case of New York City. This metropolis uses about 920 million gallons of water a day, sold to the property owners at the rate of $1.50 per 1000 cubic feet. In its reservoirs in the spring of 1940 the city had 120 billion gallons, or about four months' supply, which is abnormally low. This resulted in legislation providing for the registration of every water cooled refrigerating condenser, and limiting the total water output of any one installation to 5 gallons per minute annually.

Fortunately, there is equipment available which will permit water cooled refrigerating machines to operate with only 10-20% of the water which they ordinarily use. This is accomplished by means of an evaporative condenser or a cooling tower. In the former, condensation of the refrigerant is accomplished by the evaporation of a small quantity of water on the surface of the condenser coil; in the latter, it is the water itself which is cooled by

evaporation and recirculated through the standard water cooled condenser. Of the two, the evaporative condenser is more popular on small and medium size jobs, while the water tower proves more economical on large installations. Space factors often exert a decisive influence, however. Inasmuch as many city ordinances prohibit the running of refrigeration lines between stories of a building (except from first floor to basement and roof to top floor), water towers become mandatory when there is no space available in or near the machinery room.

There are many types of evaporative condensers on the market. In general, all embody within the same casing the following:

(1) A reservoir of water kept at a constant level by means of a float valve connected to a constant water supply.

TABLE I—Approximate installed prices of evaporative condensers or water towers. *(Based on 1940 costs in urban areas of the United States.)*

Tons of refrigeration	Freon or methyl chloride	Ammonia
3-5	$450-$600	$500-$700
7.5-12.5	$700-$900	$800-$1000
15-25	$1000-$1500	$1200-$1700
30-50	$1700-$2500	$2000-$3000

(2) A condenser coil, with or without a receiver.

(3) A means of continuously spraying the water over the coil,—such as pump and spray nozzles, slingers rotating in the water, etc.

(4) A centrifugal type fan so installed as to pass air over the condenser coil simultaneously with the water.

(5) Air inlet and outlet equipped with proper baffles.

The installation of equipment of this type resolves itself into connecting the coil inlet to the head of the compressor, and the coil outlet to the receiver, making provision for an adequate air supply. Unless the evaporative condenser is placed in the open, this usually involves running at least a discharge duct to the open to remove the moist air.

The evaporative condenser owes its efficacy to the fact that when a pound of water evaporates, it absorbs approximately 1000 Bt.u. of heat. As the water evaporates from the surface of the condenser, it absorbs this heat directly from the refrigerant, which is thereby cooled to a temperature below its condensation point. Compared to the cooling we ordinarily get from a straight water cooled condenser, where a pound of water absorbs 20-40 B.t.u., the evaporative condenser shows a theoretical saving of more than 95% of the water. In actual practice, this saving often falls to 80-90%, depending on the amount of water carried off as liquid in the air stream.

Cooling towers function in a similar manner. The hot water from the condenser is caused to flow over baffles, while air is forced through them. Part of the water evaporates, cooling the remainder to a point where it can be again used to condense refrigerant. Inasmuch as equipment of this type is usually installed out of doors, duct work for the air supply is not needed. Water lines to and from the condenser and tower, plus a pump, complete the job.

TABLE II—Approximate water costs for water cooled condensers. *(Based on a price of $1.50 per 1000 cubic feet of water.)*

Tons of refrigeration	Year round refrigeration	Summer use only (air conditioning)
3-5	$150-$300	$50-$100
7.5-12.5	$450-$750	$125-$225
15-25	$800-$1500	$250-$500
30-50	$1800-$3000	$600-$1000

And now the question will arise, "For what size refrigerating machine does a water saving device become a profitable investment?" This depends entirely upon local conditions. If legislation prohibits the use of straight water cooled condensers, then it becomes profitable to use them on all systems, except perhaps Freon, methyl chloride, or sulphur dioxide machines of under two horsepower, which may be air cooled under many conditions. Otherwise, the profit line is regulated by the cost of water.

Tables 1 and 2 give estimated costs of water saving equipment compared to the costs of operating water cooled condensers.

The Question Box

Readers are invited to send their problems pertaining to the servicing of household refrigerators and small commercial refrigerating equipment to "The Question Box."

MORE INFORMATION ON QUESTION 432

IN regard to Question No. 432, you claim that you have a leak in the evaporator shell. I have had the same trouble time and time again. I would suggest that you empty the alcohol solution and wash the brine tank with carbon tetrachloride, then refill the shell with a good grade of motor oil. I would suggest that you use SAE No. 40 oil if you are to obtain an 18° to 28° F. evaporator. If you are going to obtain a colder evaporator temperature, then use a No. 20 to 30 grade oil. I think this should end your troubles.

N. Gordon, Brooklyn, N. Y.

MORE ON QUESTION 431

REFERRING to question No. 431 in the March issue, I believe that I can suggest a much shorter method of determining the resulting temperature of the mixture of 2,000 gallons of water at 120° F. and 500 gallons of water at 60° F.

I do not believe that the total B.t.u.'s need be considered at all, inasmuch as all the ingredients of the mixture are of the same specific heat; (if we must calculate total heat, we should figure total heat above absolute zero, and make it a real problem).

My method, which I guarantee for all mixtures involving substances of the same specific heat, is as follows:

Move decimal two digits left in 2,000 and 500; thus, 20.00 and 5.00. We can also move the decimal one digit to the left in 120 and 60, but must remember to move the decimal one digit to the right in resulting temperature. The calculation then becomes as follows:

(1) $20 \times 12 = 240$ (2) $5 \times 6 = 30$
(3) $240 + 30 = 270$ (4) $20 + 5 = 25$
(5) $\frac{270}{25} = 10.8$

(6) Moving the decimal to the right one digit 108° F. is the resulting temperature. Oh no, that isn't the wrong answer. If you will check your figures you will find:

(a) 2,000 × 8.34 equals 16,680, not 16,688.

(b) 2,000 × 8.34 × 120 equals 2,001,620, not 2,001,600.

(c) 2,251,820, or your 2,251,800 divided by 20,850 equals 108°, not 106°.

Between 0° F. and 32° F., the specific heat of ice is 0.5. The latent heat of fusion is 144 B.t.u.'s per pound. The specific heat of water is 1.0. Hence, the total heat above 0° F. is: 248 B.t.u.'s per pound of 120° F. water, and 188 B.t.u.'s per pound of 60° F. water.

I sincerely hope that you will not feel offended by my criticism of your method and calculation, as I certainly have not intended to be derisive. I have gained much helpful information from the Question Box, and shall always read it attentively.

Many times I have known facts from my own experience, which I have been sure would have been interesting supplement to some of the questions and answers; but I just didn't get to writing to you. If I provoke you, please bear in mind that I do so in the interest of our business and all of us.

T. F. Busteed, Staten Island, N. Y.

CONTROLLING TEMPERATURE IN MILLS MIX COMPARTMENT

QUESTION 433: Will you please present a solution to this problem: The mix-storage compartment of a Mills ice cream freezer at times freezes the milk stored within.

The coil which cools the storage compartment has a holdover solution around it controlled by a 673 Detroit thermostatic valve. It is in parallel with the freezer and hardening cabinet. Something, possibly a loaded check valve, is in the suction line of this coil. The hardening cabinet holds a temperature of about −30 degrees F. (10 degrees lower than necessary). I am suspicious of the expansion valve because, though it be closed so as to defrost the coil, a few days later the milk is frozen. The feeler bulb of the expansion valve makes good contact at the outlet of the coil.

Is it considered that a thermostatic expansion valve can control the temperature of

this fixture when the suction pressure is so low?

If there is a loaded check valve in the suction line, can the expansion valve be closed sufficiently to not freeze the fixture yet be certain to give adequate refrigeration?

Because it is engineered without any more control equipment than stated, it seems probable that it should work satisfactorily if adjusted properly.

ANSWER: The service department of Mills Novelty Company suggests that a solenoid valve with a thermostat controlling it should be placed in the suction line of the mix compartment, between the mix compartment coil and the tee where the suction line of the hardening cabinet enters. The bulb of the thermostat can hang in the air stream so that it does not touch the metal sides of the compartment, thus regulating this compartment by the temperature of the air in it. It seems that under certain conditions, there is too great a temperature difference between this mix compartment and the other compartments to be properly controlled by merely adjusting the thermostatic expansion valve. Therefore, it is necessary to add a solenoid valve in the suction line of the mix compartment to obtain proper control.

BEER COOLING

QUESTION 434: I am installing a refrigerated beer dispenser using six taps of beer, one seltzer, and one water tap. I am using 100 feet of ⅝-inch tubing submerged around the inside of a water tank thirty inches deep, twelve inches wide, and forty-eight inches long, insulated with two inches of cork. Each beer tap has fifty feet of block-tin coil; the water coil has twenty-five feet of block tin; and the seltzer tap has two ½-gallon containers attached in series. All the coils and containers are submerged in the water tank. I am using air bubbles to agitate the water in order to maintain a constant temperature throughout the water tank.

The bartender tells me that he draws an average of ten ounces of beer a minute; peak load would be double that amount for about three hours. The amount of water and seltzer drawn is about half that of beer. The beer enters the dispenser at about 55 to 60 degrees; the water and seltzer enter at 70 degrees; and the desired temperature of beer and water is 40 degrees.

How much beer does fifty feet of block tin hold? How would you compute the B.t.u. load for refrigeration? If I used 100 feet of ½-inch tubing for refrigeration, what would be the difference? Used on a multiple hook-up system above 32 degrees, what pressure-limiting device do you recommend? Using a single hook-up on Freon gas, what pressure settings do you recommend?

ANSWER: I will endeavor to answer your questions in the order in which you have stated them. First, how much beer does fifty feet of block tin coil hold? You haven't told me what the diameter of this tubing is; therefore, I am unable to tell you how much beer it would hold; since this tubing is sold in anywhere from quarter-inch to half-inch diameters, there would be considerable difference in the different sizes. This, however, you can calculate yourself by determining the cubic inch capacity of the tubing and multiplying by .15. One ounce of liquid will occupy about .15 cubic inches of space.

Computing Heat Load

In computing the B.t.u. load of these beer coils, it is necessary to consider the peak load, or the greatest amount of beer that will be drawn at any one time through the coils. Therefore, according to your statements, at its peak, there will be about twenty ounces drawn per minute, which equals ten gallons per hour. Seltzer and drinking water you state will be about half this amount, or five gallons per hour.

The specific heat of beer is .9; however, for this small amount and for easy calculation, we will consider the specific heat of the beer as being the same as water, and from our tables, we find that one gallon of water will contain 8.34 B.t.u.'s per degree rise in temperature.

According to your statements, the beer will have to be cooled 15 degrees, and the water and seltzer 30 degrees. Our calculations then will be:

$$10 \times 8.34 \times 15 \text{ degrees} = 1251 \text{ B.t.u.}$$

for the beer.

$$5 \times 8.34 \times 30 \text{ degrees} = 2051 \text{ B.t.u.}$$

for water and seltzer.

The total B.t.u. load will be the sum of these two, or 3302 B.t.u.

Five-eighths-inch tubing has a circumference of 1.9635 inches; therefore, 100 feet of this tubing will have a total square foot area of 1.9635 divided by 12, times 100 equals 16.36 square feet.

We will work on the idea that there will be a twelve-degree temperature difference between the refrigerant and the water surrounding the coil, and because the water is going to be agitated, we will be safe in

(Continued on page 34)

COMMERCIAL

INCREASE BUSINESS BY DOING A MORE EFFECTIVE JOB OF SELLING *Selling*

Commercial Selling in Urban Communities

By Hall V. Mason

ALTHOUGH the theory of merchandising to urban prospects is basically the same as that of merchandising to rural prospects, many special problems present themselves, making necessary a different selling technique in the two communities. Like many other great industries, refrigeration is universal in scope, being of equal importance on the farm, in the city retail shop, in the manufacturing plant, and in the home. Each phase of the industry is an entity in itself, however, and in this article the author will limit himself to a discussion of the problems of selling commercial refrigeration to business establishments in the towns and cities which dot the map of the United States and Canada in ever-increasing numbers.

During the past decade there has been a marked tendency toward the production of "package" refrigeration products, i.e., the assembly at one factory of refrigerator, lowside coils, and condensing unit. The distinction between dealer of refrigerated fixtures and dealer of refrigerating equipment is rapidly disappearing. This means that every service man who looks to build towards the future must make some sort of a tie-up with a source of refrigerators. This tie-up may take any of the following forms:

1.—The service organization may act solely as a sub-contractor in the installation of refrigerating systems for fixture manufacturers and their distributors. Usually, a house of this type can handle the installation and service work for several sales organizations, in which case it can do no selling of its own which might interfere with the activities of its customers.

2.—The service organization may go into the manufacture of refrigerators. This is a new trend, and presupposes the availability of sufficient capital to put into this work.

3.—The service organization may take on a line of fixtures in the capacity of dealer or distributor. This too requires a certain amount of capital to provide for the financing of much larger amounts than is involved in merely selling a refrigerating system without fixtures.

4.—The service organization may act as a commission agent for one or more fix-

ture houses. This requires no capital outlay, and consequently provides the least return per item sold (but not necessarily the least net return).

The best course for any individual serviceman to follow depends on his capitalization, his abilities, and the local competitive situation. Is there the need in your locality of a good service house to handle the installation work of several local fixture dealers? Or do you feel that you could do a good job selling fixtures in conjunction with compressors and coils? Whichever plan you choose, or even if you prefer to remain an exclusive selling agent for condensing units and coils, here are some hints which might be useful in increasing sales and service in your community.

1.—CASE OF SERVICE ORGANIZATION ACTING AS SUB-CONTRACTOR FOR FIXTURE HOUSE

Very few fixture houses can afford to have a refrigeration crew of their own equipped to provide the 24 hour service which is necessary in the maintenance of refrigeration equipment. By combining the work of two or more fixture houses, however, an efficient service organization can provide immediate installations and constant service at a reasonable price. The ideal way to solicit business of this type seems to be on a flat rate basis for installation and 1 year service. A fair average rate can be worked out based on the horsepower of the condensing unit and the number of coils, thus avoids the waste of time involved in negotiating a separate rate for each installation.

This type of a set up is ideal for the operator whose talents definitely lie in the field of service as opposed to sales, although the problem of selling one's services to the fixture house still remains. Not to be overlooked is the opportunity for developing an independent service business upon expiration of the 1 year free service contract. Assuming, of course, that the service rendered was satisfactory, the original installer is in a key position when it comes to negotiating for future service contracts, or service on a fee basis.

2.—CASE OF SERVICE ORGANIZATION IN FIXTURE MANUFACTURING BUSINESS.

The combination of service house with fixture manufacturing department requires the availability of the necessary capital to set up a well equipped shop where refrigerators may be manufactured economically, and to create a sales force efficient enough to support the shop. For these reasons, this plan will probably be the least plausible one for the average service man. Its chief advantages lie in the facts that the quality of the entire installation can be closely controlled, and that special size or special type fixtures present no difficult problems. To the distributor of a standard line of fixtures a 7½′ showcase or a walk-in cooler built to fit around a column means a delay of several weeks, plus a premium in price. The organization with its own manufacturing department, however, can handle "specials" with ease and at standard cost of production.

3.—CASE OF SERVICE ORGANIZATION ACTING AS DEALER FOR FIXTURE HOUSE.

The service organization with even a modest amount of capital at its disposal can usually make arrangements to serve as a dealer for a reliable fixture manufacturer. Often the financing of the fixtures can be taken care of through a factory credit arrangement, providing more reasonable interest rates than might be obtained by an individual organization, and allowing for the discounting of more paper than factoring houses would otherwise accept. In addition to providing aid in financing, a well-known line of fixtures will enhance the prestige of a service house, and bring in sales inquiries which otherwise would have been missed.

4.—CASE OF SERVICE ORGANIZATION ACTING AS COMMISSION AGENT FOR FIXTURE HOUSE

Every serviceman is in daily contact with prospects who are or will be in the market for refrigerated fixtures. Should he not be in a financial position where he can take on a line of fixtures for direct resale,

he can at least make arrangement with some local fixture house to act as a salesman on a commission basis. This can provide a return of as high as 20% of resale price without any investment or financial risk whatsoever.

5.—GENERAL SUGGESTIONS APPLYING TO ALL TYPES OF SALES-SERVICE HOUSES.

1.—If you have a service crew, encourage a sales outlook in them by offering a bonus for every lead brought in which results in a sale.

2.—Offer a period of free service to existing customers recommending their friends who are subsequently sold.

3.—Make a periodic canvass by telephone of local merchants, offering a free inspection of existing refrigeration equipment. This provides an excellent entree for a personal call.

4.—Analyze service records and follow-up all sales prospects.

5.—Devote slow season to negotiation of service contracts.

Service Salesmanship

By G. E. Graff *

SALESMANSHIP is something that does not have a definite formula. Many plans have been worked out, but I think that barring a few basic principles, every service man should follow his own methods.

Regularly organized sales departments doing creative selling, of course, must plan sales campaigns and work systematically to get the desired results.

Service Salesmanship begins with yourself, your neatness, the looks of your car or truck, the condition of your tools and spare parts.

Keep parts wrapped or boxed. Just look at the average store today. You don't see the old bins and shelves of bulk goods —you see attractively packaged merchandise—everything from spaghetti to expansion valves is in a fancy package today. Why? Because neat, good-looking packages help sell.

First you must build a reservoir of good will from which you can later draw when you need it. Many years ago an old English Judge, while giving a court decision, said, "Good will is the probability that old customers will resort to the old place." *"Good Will"* creates resales. "Good Will" is the one asset that every salesman and dealer strives for. The service man can obtain it more easily than anyone else.

Never argue with a user. Remember, its not so much what you say but how you say it that counts. The user rarely understands the product and often is not interested in it. What he is really interested in is *what does it do* for him. This is something that you should know and explain to him.

Some say it's hard to sell now—conditions are uncertain—prices are high—but what of it? Factories are working—workers are getting paid and they will spend.

I recently saw reliable copyrighted statistics showing that in 1940 Canadians spent almost half again as much on horse race bets as on refrigerators. You have a service to sell that does not have the element of chance of a horse race. You can always give your customer value for his money.

If you are a service man with an organization that has a sales department such as a distributor, dealer or store, you should know the sales points used by that sales department to promote their products and so be able to strengthen the stories of the man who sells the equipment and makes possible your work.

Never belittle the intelligence of the sales force to the user no matter how dumb

* Ranco Inc., presented before the 2nd Annual Convention sponsored by Ontario Maple Leaf Chapter R.S.E.S.

you may think they are—they are trying to make a living too and are helping create work for you.

If you come to a job that you think is not properly laid out, pass the word back to your dealer or Sales Manager as to how you think the installation should be or what changes are needed. Don't tell the user and reduce his confidence in the future operation. You are only making trouble for yourself in the future.

Be loyal to your product and help the sales force do their job.

You have a wonderful opportunity to aid your salesmen by promoting additional equipment and accessories.

What About the Independent Service Man?

The independent service man, of course, has greater freedom, but, having no sales force to create work for him, must stand on his own feet. He is in a position to do a lot of selling and must do it to survive.

How can he sell?

Well, how does the average salesman introduce himself? He says, "My name is Bill Smith. I sell So and So," or, "I represent XYZ Company." The prospect is at once on his guard, and usually takes a defensive attitude. The salesman has to overcome this and may make many calls to overcome that resistance with his direct selling methods.

Now, Mr. Service Man, you have a different approach. You go to a user because he has use for your services, he needs you. That's a big point in your favor. He is more receptive to indirect selling by you.

You will, or should make a favorable impression by your neatness and workmanship. That's another point in your favor.

Get the user to talk to you about things of interest to himself. Maybe you will have to lead him on to these subjects. You know what they are—himself, his family, his health, his work, his business, his finances.

Without thinking, he will tell you the most important things you need to know. Can he really afford to buy the things he would like to buy? Since you know what he has and can judge what he needs, by suggestion you can start his mind working and he can be shown that he needs certain other equipment or changes and improvements in what he has.

Then, as occasion warrants, you can either tip off the proper salesman or call your superior, or start your own direct selling.

Whatever you do in your selling, don't *knock* any other equipment or person.

Tell the virtues of that which you wish to sell. Don't confuse your prospect by offering him three or four alternate items—he does not know their relative merits. Pick out just one coil or one compressor, valve, control or a definite group of items. Show the good points of these items—stress their value to him and what they can do for him. That is what interests him.

Closing the Sale

Keep the price out of the picture until you have sold the idea and the product.

When you have the idea firmly planted, the picture of what it can do for him clearly in his mind, and he understands what it all means, then is the time to talk price and press him for the order.

If you do get the order, finish up quickly and get out—don't stay and talk yourself out of it.

If you don't get the order, be cheerful. Leave the way open to come back another time and try again. Above all, *don't* antagonize your prospect or argue.

Your job as service engineer is first to install and service, and you owe it to yourself to educate yourself to do this in the best possible way.

Research and development is going on all the time and you cannot stand still—you must keep yourself up to date and grow with this industry.

From the careful study of literature on new products and regular attendance at the various educational meetings you can prepare yourselves for better things to come.

Look to the future—sell yourself—sell your services—sell good dependable refrigeration and we will all prosper.

Refrigeration Engineer Solves an Unusual Manufacturing Problem

By Robert Latimer

★ ★ ★

REFRIGERATION service engineers are generally agreed that there are far more markets for commercial refrigeration and service thereafter than are "open to the eye"—and that few firms do much about it. H. S. Woodard Company, however, large domestic, commercial and refrigeration service dealership of St. Louis, Missouri, is one company which provides a perfect example of how "outside prospecting" can bring in almost unsuspected business.

Recently, the Woodard commercial refrigeration department made one of the most unusual refrigeration installations in the history of refrigeration promotion in the city of St. Louis—a four-hole ice-cream cabinet sold to the J. H. Grady Company, and installed on the third floor of the Grady company's building at Tyler and Ninth Streets in the Missouri metropolis' river-bank manufacturing district. The fact that the sale was made after repeated calls by salesmen is not unusual—but the fact that the ice cream cabinet is being used entirely for making major league baseballs is unique.

For several months, salesmen of the Woodard Company, which maintains a full-sized refrigeration service department and is thus qualified to tackle unusual installations of all types, had been attempting to sell the Grady Company water coolers, storage refrigeration and even air conditioning, without a great deal of success. As a "potential" prospect, however, the baseball manufacturing firm, which had a large personnel of employes, with consequent need for comfort cooling and drinking water refrigeration, was felt worthwhile.

In the course of one of his calls, a salesman-engineer of the Woodard Company was taken through the factory, where the Grady Company turns out softballs and baseballs, many of the latter used through the baseball training season by major league and minor league baseball teams. Turning out 500 dozen of these baseballs per week the year around, the Grady Company builds up an advance stock of baseballs ready to answer the heavy calls made through the summer by retailers and baseball clubs. Yet there were frequent instances in which orders had to be held up and lost through one peculiarity of baseball manufacture—the fact that covers for the balls must be kept wet, and sewn on the string core in that condition. As the polished white leather dries out, the ball cover shrinks tightly over the core, resulting in the perfectly spherical final product.

The salesman noted that wetting the die-cut leather covers, and keeping them in correct condition for sewing, was a laborious process, and one which often tied up production for several hours while a new supply of covers was given correct treatment. Sudden rush orders were likely to deplete the entire stock of dampened covers on hand, and as a result hours were lost in making up an extra stock.

The Salesman's Bright Idea

This fact gave the Woodard Company salesman an illuminative idea—why not try refrigerating the leather covers in advance, keeping an ample stock on hand for any emergency, and thus not interfering with regular production in any way? The idea was discussed by the St. Louis refrigeration dealer thoroughly, found practical, and submitted to the Grady Company at once. This was in September, 1940. It developed, however, that the Grady management had once before tried this process in the baseball sewing room,

using a roughly-constructed refrigerating system built by the plant itself, which kept temperature down to 10 degrees without a great deal of efficiency. Their results had not been satisfactory.

"That's where our selling job began," "Woody" Woodard, president of the firm pointed out. "We had to overcome their resistance in several ways. How it was done was to offer the use of the ice-cream cabinet for 60 days, the Grady Company to pay hauling costs, and a slight rental if the idea did not work out." That it did can be seen that the Woodard business office received a check for the cabinet a few weeks after it was installed.

A large percentage of the baseball-manufacturing firm's leather covers are now dampened by a spray process, wrapped in waxed paper in lots of one dozen, and stored in the ice-cream cabinet (a standard Frigidaire model) until needed. For purposes of preventing frost accumulation where the damp leather is kept at temperatures of 4 degrees above zero, the Woodard Company ordered four square metal cans, of the type used for ice-cream freezing, to fit into each hole. Containing around 200 covers each, these cans can be lifted out for regular defrosting, and are loaded completely before being placed in the cabinet.

As a result, when rush orders are brought in, there are always enough dampened covers on hand for the Grady firm to manufacture baseballs to fill it—and production has been greatly speeded up all along the line. This is an ideal example of how down-to-earth prospecting can result in additional refrigeration sales.

Prospect Cards Show Progress Made on Sales

BUILDING on a foundation of satisfied service customers, intelligent advertising and a certain amount of cold canvassing, McCarty Bros. Equipment Corp., 7811 W. Lake St., River Forest, Ill., has built a substantial business, covering a territory of eight to ten miles radius and with a population of about 450,000.

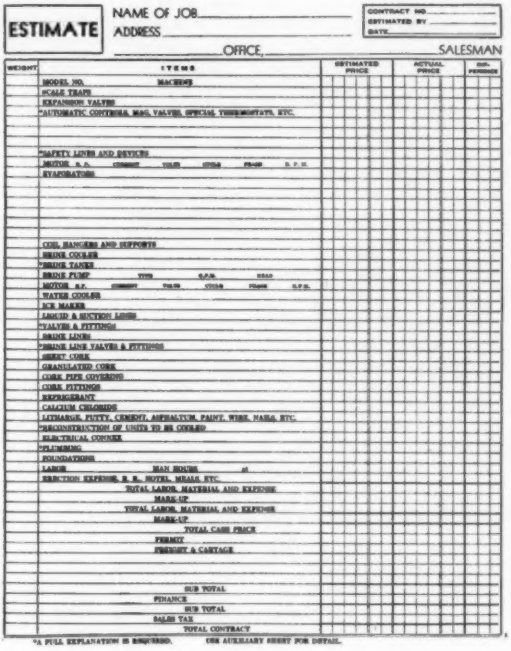
Although this concern started originally as a service organization and still continues its Service Department, its chief efforts starting some three or four years ago, have been on sales of commercial refrigerating equipment.

When a salesman contacts a prospect, he makes out two prospect cards, one a master card which goes to the files in the office, and the other which he carries with him. On this card is noted the name and address, kind of equipment, when the first call was made and this is followed up, with dates of subsequent calls with notations as to the progress made. This additional information is transferred by the salesman to the master card. After 90 days, if a sale has not been made, a prospect becomes any salesman's property and may be solicited by any of the other salesmen.

Every installation made is given a job number and a folder in which are filed the contract, bills for materials, invoices and all other data pertaining to that particular job. This folder is held in the current file until it is finally completed at which time is is filed and retained as an office record.

A selling aid that has proved quite effective for the salesmen is a typewritten sheet showing selling prices for cases and machines, with a grand total cost obtained from averaging some 200 installations of similar character. With the use of this, the salesman can quote exact prices on about 80 per cent of the equipment handled by the store. For any job not included in this list price, an estimate sheet is made out.

Salesmen are impressed with the fact that this estimate sheet is a very important part of making the sale. No salesman can sell intelligently and no prospect can listen intelligently until they both know the actual cost of the job and this estimate sheet, reproduced on this page, if properly made out with careful attention to detail, correct auxiliary and other equipment, etc., will give the exact figure.



ESTIMATE

NAME OF JOB_____ CONTRACT NO._____
ADDRESS_____ ESTIMATED BY_____
DATE_____

OFFICE_____ SALESMAN

WEIGHT	ITEMS	ESTIMATED PRICE	ACTUAL PRICE	DIFFERENCE
	MODEL NO. MACHINE			
	SCALE TRAPS			
	EXPANSION VALVES			
	*AUTOMATIC CONTROLS, MAG. VALVES, SPECIAL THERMOSTATS, ETC.			
	*SAFETY LIMITS AND DEVICES			
	MOTOR H.P. CURRENT VOLTS CYCLES PH-AP R.P.M.			
	EVAPORATORS			
	COIL HANGERS AND SUPPORTS			
	BRINE COOLER			
	*BRINE TANKS			
	BRINE PUMP TYPE G.P.M. HEAD			
	MOTOR H.P. CURRENT VOLTS CYCLES PHASE R.P.M.			
	WATER COOLER			
	ICE MAKER			
	LIQUID & SUCTION LINES			
	*VALVES & FITTINGS			
	BRINE LINES			
	*BRINE LINE VALVES & FITTINGS			
	SHEET CORK			
	GRANULATED CORK			
	CORK PIPE COVERING			
	CORK FITTINGS			
	REFRIGERANT			
	CALCIUM CHLORIDE			
	LITHARGE, PUTTY, CEMENT, ASPHALTUM, PAINT, WIRE, NAILS, ETC.			
	*RECONSTRUCTION OF UNITS TO BE COOLED			
	ELECTRICAL CONNEX			
	*PLUMBING			
	FOUNDATIONS			
	LABOR MAN HOURS @			
	ERECTION EXPENSE, R. R., HOTEL, MEALS, ETC.			
	TOTAL LABOR, MATERIAL AND EXPENSE			
	MARK-UP			
	TOTAL LABOR, MATERIAL AND EXPENSE			
	MARK-UP			
	TOTAL CASH PRICE			
	FREIGHT			
	FREIGHT & CARTAGE			
	SUB TOTAL			
	FINANCE			
	SUB TOTAL			
	SALES TAX			
	TOTAL CONTRACT			

*A FULL EXPLANATION IS REQUIRED. USE AUXILIARY SHEET FOR DETAIL.

★ Estimate sheet which has proven to be such an important factor in selling Commercial Refrigeration for the McCarty Bros. service organization.

Discussing the trend of the refrigeration business, having in mind his own experience and knowing something about the experience of others, Mr. McCarty is convinced now as much as he was some five or six years ago, that the future for a strictly service business is quite limited, but, on the other hand, the future for a vigorous selling organization is quite good and in his particular case, the combination of a service and selling organization is just what is needed.

Credits and collections have not proven a serious problem, although collections do need careful attention and following through on a business basis. An account delinquent 30 days, he believes, should be sent a special statement, after 60 days they should have a letter, and after 90 days some definite action should be taken. The company belongs to a local credit bureau and adequate information on the credit rating of customers has been obtained from this bureau.

Mr. McCarty admits that because of the pressure of sales and service work and other parts of a business organization, this particular phase of the business has not been given the attention that it needs and this is one of the things planned for '41.

Although half the sales made by this company are to former service customers, these sales are not by any manner of means "push overs," because even though the prospect might be an old customer of the concern and had full confidence in the salesman, he still requires selling. In other words, they've got to be sold.

QUESTION BOX

(Continued from page 26)

selecting a K factor of 15 for this coil. One hundred feet of ⅝-inch tubing, therefore, will be capable of absorbing—

$12 \times 15 \times 16.36 = 2844$ B.t.u. per hour.

Apparently, 100 feet of ⅝-inch tubing is none too large. However, under the operating conditions, there will be a three hour peak load, and during the balance of the day, the load will be approximately half of what we have figured. Therefore, it can be assumed that during the balance of the day there will be a considerable ice accumulation around the coil, which will act as a holdover to be used up during the peak load period. I believe, therefore, that a hundred feet of coil will be ample to take care of this job. After the above calculations and description, you can readily understand that ½-inch tubing would not be satisfactory for this job and would not provide sufficient square feet of cooling surface. If you wish to calculate the actual difference, you may substitute the figures for ½-inch tubing where ⅝ is used in the above.

If this cooler is used in a multiple system where all of the coils in the system are operating above 32 degrees, the only pressure-limiting device necessary would be a constant-pressure valve in the suction line, adjusted so that the pressure would never be lower than about 26 pounds back-pressure, in order to prevent the water bath from freezing solid. In using the coil on an individual machine charged with Freon, the pressure settings on the pressure switch should be 17 pounds cut-out and 27 pounds cut-in. In other words, it is desirable to hold a temperature of about 28 degrees in the coil.

STARR-FREEZE REFRIGERATOR

Question 435: I'm having trouble with a Starr-Freeze domestic refrigerator. I do not find any model number for this unit stamped on the back of the box, other than 5-D-1. I believe this box is about eight years old.

My trouble seems to be in the lowside float. For some reason or other, the suction line keeps frosting back to the compressor regardless of the amount of gas in the system.

I have taken out the needle valve, and it's in good shape. However, I did notice that the suction line, just as it comes from the evaporator, freezes slightly faster than it does at the bottom of the evaporator. Would you suggest cutting open the float chamber for examination of the float, and then rewelding it?

If possible, please give me the correct charge of oil and gas for this unit. Any information regarding the Starr-Freeze unit will be appreciated.

Answer: According to the information I have the 5-D-1 Starr-Freeze refrigerator was manufactured in 1930. It contains 2½ pounds of SO_2 and five ounces of oil. The lowside float on these machines is made of copper and brass, and to the best of my knowledge, they are soldered and not welded. Therefore, it is possible to take them apart simply by applying heat, which eliminates the necessity of cutting them apart.

Recalibrate Float

Since you state that the needle in this float holds perfectly, there is only one other possibility which will cause the suction line to frost, and that is that the float is out of calibration. I am not familiar with the construction of this float, but usually, where the float needle cage is removable, it is also possible to calibrate simply by lengthening or shortening the needle. In this case, it would be necessary to lengthen the needle, or by some means, permit the needle cage to be inserted into the float a greater distance than at present. By doing this, the float needle shuts off with a lower level of refrigerant than it does at present. I'm not able to give you detailed information as to how this might be done, but at least these suggestions may help you in finding some means of permitting the needle to be inserted a greater distance into the evaporator. I would think that an extension of not more than a sixteenth of an inch would be sufficient.

If it comes to the point of having to open the float, I would be of the opinion that it would be cheaper for the customer to purchase a new evaporator and automatic expansion valve, thus eliminating the lowside float. Using an automatic expansion valve would probably improve the speed of freezing and give you better overall operation of the system.

✕ ✕ ✕

Walter S. Palmer
Maine.

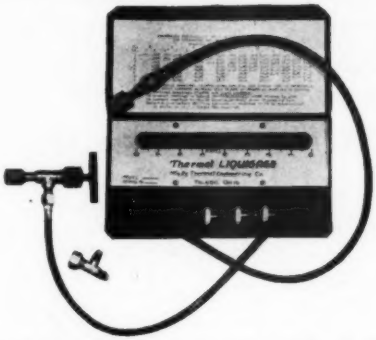
Please continue sending that most valuable book, The Refrigeration Service Engineer.

New and Improved Appliances

Information contained in this department is furnished by the manufacturer of the article described and is not to be construed as the opinion of the Editor.

THERMAL "LIQUIGAGE"

A NEW tool for the service field known as the Liquigage has just been announced by Thermal Engineering Co., 4125 N. Lockwood Ave., Toledo, Ohio.



THE LIQUIGAGE COMPLETE WITH HOSE, VALVE AND TEES.

The Liquigage is a refrigeration testing instrument which provides a visual indication of the refrigerant level in the receiver of the condensing unit being tested. It consists of an indicating apparatus, adapter valve tees for insertion in the liquid line, a valve to operate the tee, and flexible hoses for making connections. All are housed in a metal case.

The instrument utilizes the principle of the U-tube manometer in which the liquid receiver acts as one leg and the Liquigage the other. This principle is that if equal pressures are applied to each leg, liquid placed in the tube will rise in the legs until the same level is reached. Thus regardless of whether the top of each leg is opened to the atmosphere as in Fig. 1, or if the tops are closed and connected together by a pipe as shown in Fig. 2, and a pressure applied, the level will still be the same. If the liquid

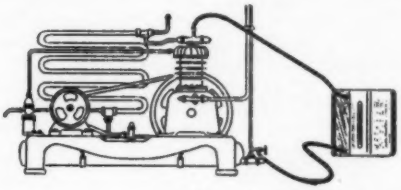


FIG. 4.

in Fig. 2 were a refrigerant the pressure applied would be that of its temperature-pressure relationship. If the large container to the left is considered as the liquid receiver, the one to the right will be the indicating apparatus of the Liquigage, the connection at the top (A) replaced by an air or water-cooled condenser and the longer flexible hose of the Liquigage; and the connection (B) at the bottom replaced by the adapter valve tee, operating valve and short flexible hose of the Liquigage, the result is the essential circuit of the Liquigage testing method (Fig. 3). Since the Liquigage tube is transparent the height of the liquid can be measured on the scale.

In practice the Liquigage is connected as shown in Fig. 4. The adapter valve tee is inserted between the liquid receiver and the liquid line and the operating valve connected to it. The long flexible hose is connected to

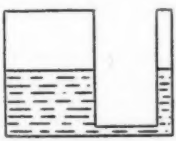


FIG. 1.

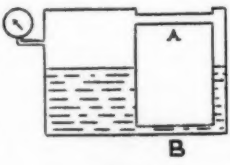


FIG. 2.

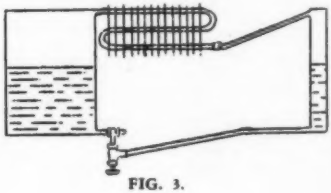
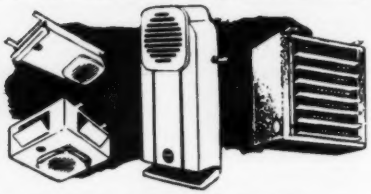


FIG. 3.

Have you counted up t



OVER 100 DIFFERENT SIZES

give you a model to fit every installation . . . wall, ceiling, mullion and suspended models for standard refrigeration, low temperature and comfort cooling. Single and Twin Fan models . . . BUY FEDDERS.

ALL-COPPER GRAVITY COILS TO FIT EVERY JOB

Finned and plain tube coils . . . copper tubes and copper fins in metal-to-metal contact . . . genuine pure tin finish. No moisture troubles because absolutely dehydrated . . . BUY FEDDERS.

CONSTANT PRESSURE, THERMOSTATIC, AUTOMATIC AND CHECK VALVES

assure accurate control of refrigerant on single and multiple hook-ups. Built for Refrigeration Men by Refrigeration Men . . . Specify and BUY FEDDERS.

ABSOLUTELY DEHYDRATED

A special dehydrating process in thermostatically controlled ovens, combined with 29 inch vacuum absolutely removes every trace of moisture . . . PLAY SAFE, BUY FEDDERS.

ACCESSIBLE DESIGN, EASY TO SERVICE

Unit Cooler grille and fan mounting quickly removable for oiling motor and adjusting valve . . . another example of how 1941 Fedders products are built to please refrigeration men . . . BUY FEDDERS.

125 WHOLESALERS AT YOUR SERVICE

Fedders electric refrigeration appliances are right around the corner from you. Leading wholesalers are ready to give prompt service on Fedders Units . . . BUY FEDDERS.

FEDDERS FIELD MEN GIVE ENGINEERING TEAMWORK

Take advantage of the experience of Fedders factory-trained field men. They know refrigeration and how to make it work. They sell by SERVING, so why not BUY FEDDERS.

FEDDERS ADVERTISING ACTUALLY SELLS FOR YOU . . .

Because it contains the quality story and buyers know, respect and approve products carrying the nameplate, . . . MADE BY FEDDERS. Take advantage of Fedders advertising which has been doing a Pre-Selling job for you . . . it is another extra plus value of Fedders products. BUY FEDDERS.

FEDDERS NEWS GIVES ENGINEERING DOPE

Kinks on what to do and how to do it appear constantly in FEDDERS NEWS. Written by Chief Engineer Joe Askin, they are straight from the shoulder, usable, helpful and practical. Another reason why it pays to BUY FEDDERS.

FEDDERS MANUFACTURING CO., BUFFALO, N. Y.

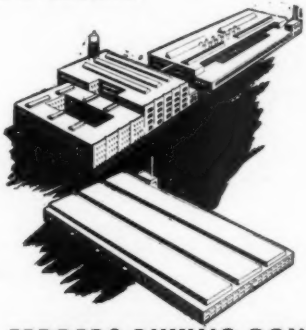
...up the many fedders SERVICES FOR SERVICE ENGINEERS

NO "GUESSTIMATING" IN FEDDERS CATALOGS

ACCURATE RATINGS . . . complete working data . . . convenient arrangement for quick reference . . . you never have to "GUESSTIMATE" a job when you depend of what Fedders puts down in black and white! PLAY SAFE! SPECIFY and BUY FEDDERS.

COPPER . . . THE PRECIOUS METAL OF REFRIGERATION

For 45 years, Fedders has recommended COPPER as the most efficient, most durable and most valuable metal for providing and maintaining high heat transfer. Today more than ever before, COPPER is recognized as the "precious metal" of the refrigeration industry. Any engineering hand book will tell you that no other commercial metals except gold and silver have heat transfer ability equal to COPPER . . . BUY FEDDERS.



FEDDERS BUYING POWER ASSURES DELIVERY

Two great plants with production measured in millions, not thousands, give Fedders the buying power, financial standing, reliability and assured deliveries that safeguard you and your customers. PLAY SAFE...SPECIFY and BUY FEDDERS.

IT PAYS TO STANDARDIZE

SPECIFY AND BUY

fedders

ELECTRIC REFRIGERATION APPLIANCES

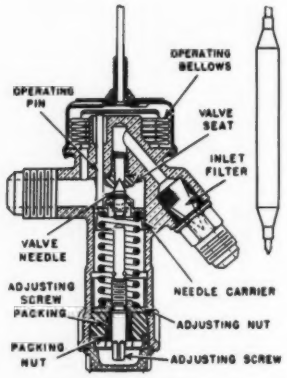
Atlanta, Boston, Chicago, Cincinnati, Dallas, Detroit,
Los Angeles, New York, Philadelphia, St. Louis, Hamilton, Ont.

the gauge fitting in the service valve on the head of the compressor. This service valve is then cracked open and the operating valve turned so the adapter valve tee will open and allow the refrigerant to flow into the Liquigage. When it has risen to a height equal to that of the liquid in the receiver it will become stationary and the reading can be taken. There are slight variations of this procedure for certain types of condensing units for which full retails are given in the instruction book which accompanies each Liquigage.

* * *

FRIGIDAIRE MODULEX VALVE

THE Modulex valve was designed to eliminate those inherent disadvantages found in both liquid-charged and gas-charged thermostatic expansion valves. This was accomplished, in part, by using an inert gas charge and a solid adsorber. Briefly, its action is as follows: as the temperature of the adsorbent increases, its ability to adsorb the inert gas decreases, resulting in a higher power element pressure, and, conversely, as the temperature of the adsorbent decreases, its ability to adsorb the inert gas becomes greater, and varies in proportion to the temperature change. The inert gas charge at no time throughout its operation ever condenses or liquefies.



NEW MODULEX VALVE

The following is a list of the advantages claimed for the Modulex Valve:

1. Extremely sensitive to suction line temperature changes. The small, flattened power element containing the solid adsorbent and the inert gas charge does not have the slug-

gishness found in liquid-charged valves because of the decreased time element required to register temperature changes.

2. Only the thermostat bulb is sensitive to temperature changes. The valve has been tested on high temperature applications wherein a sponge saturated with liquid Freon completely surrounded the entire valve and power element line. A 22° below zero temperature surrounding the valve and line did not affect the operation of the valve in any manner, even though the valve was controlling a commercial evaporator operating with 20° above zero temperatures.

3. As indicated above, the valve can be operated in locations where the temperature of the valve body will be colder or warmer than the power element bulb. It can also be installed in any position.

4. The valve is completely sealed against infiltration of moisture, which would affect the power element operation. The power element cap is made entirely of metal and is soldered to the valve body.

5. All internal moving parts are easily accessible through the lower part of the valve, permitting field shop reoperation with a minimum expense for both time and material.

6. A protective screen, which may be removed for cleaning, is held in place by the liquid inlet fitting. The outlet connection is machined as a part of the valve body.

7. The needles are constructed of hardened stainless steel, and the valve seats are made of stainless metal designed to reduce eroding and corrosion. The valve adjustment spring is also stainless steel.

8. An adjustment is provided so that the super-heat setting of the valve can be changed to meet existing evaporator designs.

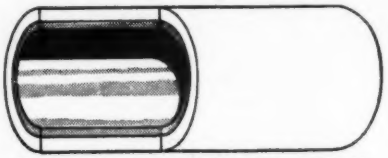
9. The valve is small in size, measuring from top to bottom only 3-5/8", and 3-7/16" at its widest point. The average weight is 14 ounces.

S S S

BRIDGEPORT'S BI-METAL TUBING FOR SEVERE CORROSION CONDITIONS

IN oil refining, chemical plants and in many processing industries, it is frequently found that heat exchanger tubes and other piping made of a single metal or alloy rapidly fail from corrosion attack both from within and without. Duplex tubing, having an inner tube of one metal or alloy and an outer tube of a different metal, recently introduced by the Bridgeport Brass Company, is rapidly being applied to new uses in the many other fields where tubing is subjected to two different types of corrosive attack.

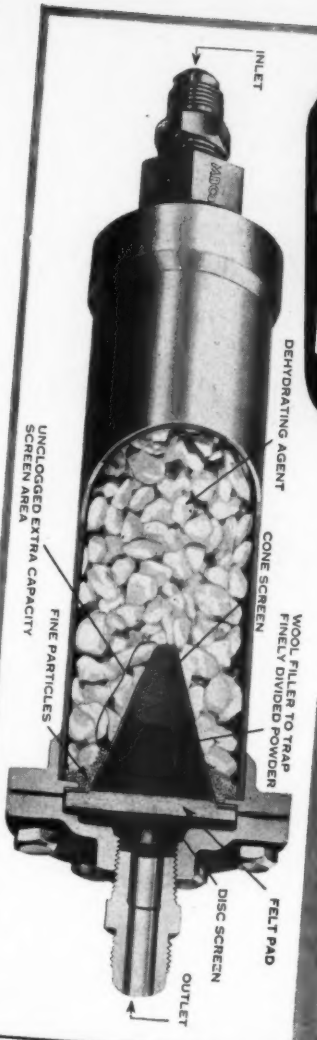
For applications of this sort, Bridgeport now manufactures bi-metallic tubing, with the combination of metals chosen to meet specific conditions. For oil refinery work, tubing made of steel outside for corrosive oil vapors and copper inside for circulating fresh water has been found excellent; steel outside for same conditions and Admiralty brass inside for circulating salt water. Other combinations successfully used include for certain chemical plants Duplex tubing of Admiralty outside for circulating brackish water and aluminum inside for certain chemicals; in refrigeration plants using ammonia, a combination of steel outside to resist ammonia attack and copper inside to withstand circulating water corrosion. Bridgeport's



CUTAWAY VIEW OF BI-METAL TUBING

new bi-metal composite tubing consisting of copper outside and steel inside is excellent for piping illuminating gas in soil exceptionally corrosive to steel piping. In certain food processing industries where the foods and oils become rancid in ordinary tubing, stainless steel and brass and other combinations have overcome difficulties. Other combinations successfully used thus far by various industries include: Cupro-nickel outside, red brass inside; stainless steel outside, Admiralty inside; steel outside, Cuzinal (aluminum brass) inside.

Illustrated here is the construction of Duplex tubing. By Bridgeport's method of processing, a good close contact is obtained between the two materials in the composite tube without interfering with the heat transfer where that is needed. Where Duplex tubes have to be expanded or rolled into a tube sheet, they are supplied with annealed or tempered ends. Although this new tube now rapidly entering the processing fields generally costs a little more than tubing of one material, by using the correct combination it is often possible to reduce wall thickness, especially where an expensive material had to be used previously. The increased service makes Duplex tubing more economical.



When You Buy DEHYDRATORS Also Buy DEPENDABILITY

● Mueller Brass Co. Dehydrators are provided with a greatly improved feature...THE CONE SHAPED SCREEN, as illustrated here.

The cone shaped screen filled with pure wool, directs the fine particles of the drying agent to the outside of the base of the cone. Any particles that pass through the screen will lodge in the wool filler without clogging, leaving the center free for the passage of the refrigerant.

We build a complete line of reliable dehydrators, and they are sold at a fair price. We know the consumer does not want an inefficient dehydrator even at the saving of a few cents, and we don't believe that you would knowingly risk the possible loss in dollars as well as in reputation. A small increase in cost necessary to make any device thoroughly reliable is always justified. When you buy dehydrators, also buy that dependability which is built into all Mueller Brass Co. time-tested refrigeration Products.

MUELLER BRASS CO.

MUELLER SEALED REFRIGERATION PRODUCTS

Your jobber deserves your patronage. He assembles thousands of products of hundreds of manufacturers from all parts of the country. He stocks them under one roof so that you can get what you want in a hurry, and at the right price.

PORT HURON, MICHIGAN

MEMO TO SERVICE MEN!

● Every once in a while, some sensational improvement comes along that means an important saving of time and money in service operations, and also does a better job. We're sure that when you investigate the new and exclusive Frigidaire Modulex Expansion Valve you'll find it's one of the most outstanding of such improvements in some time.

Service Sales Department
Frigidaire Division, General Motors Sales Corporation
Dayton, Ohio

Sensationally New

FRIGIDAIRE Precision-Built MODULEX VALVE

Four Reasons why no other expansion valve matches it!

1 May be installed in any place—in any position! Hermetically sealed from all moisture. Solves installation difficulties of ordinary expansion valves. Saves time on every installation!

2 Reduces Suction Pressure Surging! This valve gets its name, "Modulex," from this advantage—from its modulating control of the refrigerant. Because this valve tends to keep the evaporator filled with refrigerant, it increases the efficiency of the evaporator and more even temperatures can be maintained.

3 Lowest Price in Frigidaire history! All the advantages you've been looking for in refrigerant control—and all at an amazing low price, the lowest in Frigidaire history for a comparable valve! Don't fail to investigate for your installations.

4 Small—Vest Pocket Size! From top to bottom it's only 3⅝". Greatest width at any point is only 3 7/16"—and it's only 1⅜" thick. Carry it in your vest pocket if you want to. Overall weight only 14 ounces!

● Now, when you install an expansion valve you don't have to work with a clumsy, expensive, hard-to-handle valve that must be placed in just the right position to provide even satisfactory refrigerant control. No. You simply install Frigidaire's new low-cost, vest pocket size Modulex Valve, *wherever it's most convenient!* And don't worry about its operation.

This new valve is built with the same precision and quality workmanship as the world-famous Frigidaire refrigerator. It's backed by years of Frigidaire and General Motors engineering experience. It's stood the test of time and use in over 2500 installations!

Investigate this sensational new Frigidaire Precision-Built Valve, now! See how much better service you can give your customers, how much time and money you can save with its amazing improvements and low price. Contact your Frigidaire Distributor at once. Mail coupon on next page, today, for *free* descriptive booklet with full details, including prices.

FROZEN IN A BLOCK OF ICE!

The ONLY vapor-charged Valve which is not affected, in operation, by surrounding temperatures. May be installed in any place, in any position!

Contact YOUR Frigidaire Distributor!

Ohio Edison Co., *Akron, Ohio*
Colonie & Montgomery Sts., *Albany, N. Y.*
675 Greenwood Ave., *Atlanta, Ga.*
Pratt St. & Market Pl., *Baltimore, Md.*
420 N. Broadway, *Billings, Mont.*
600 N. Seventh St., *Birmingham, Ala.*
23-25 Blandford St., *Boston, Mass.*
1100 Main St., *Buffalo, N. Y.*
Merchandise Mart, *Chicago, Ill.*
1729 E. 22nd St., *Cleveland, Ohio*
P. O. Box 1052, *Dayton, Ohio*
1920 Market St., *Denver, Colo.*
824 Mulberry St., *Des Moines, Iowa*
4584 Maybury Grand Ave., *Detroit, Mich.*
500 San Francisco St., *El Paso, Texas*
2615 W. 7th St., *Fort Worth, Texas*
55 E. Washington St., *Hagerstown, Md.*
3104 Main St., *Houston, Texas*
927-31 N. Meridian St., *Indianapolis, Ind.*
212 Michigan Ave. West, *Jackson, Mich.*
2619 McGee Trafficway, *Kansas City, Mo.*
1057 North LaBrea Ave., *Los Angeles, Calif.*
831 E. Broadway, *Louisville, Ky.*
1071 Union Ave., *Memphis, Tenn.*
134 N. W. Third Ave., *Miami, Fla.*
647 West Virginia St., *Milwaukee, Wisc.*
4 Cummins Station, *Nashville, Tenn.*
19 E. Washington St., *New Castle, Pa.*
4436 Toulouse St., *New Orleans, La.*
P. O. Box 300, *Norfolk, Va.*
1250 53rd St., *Oakland, Calif.*
811-13 N. Broadway, *Oklahoma City, Okla.*
2558 Farnam St., *Omaha, Nebr.*
316 S. Jefferson Ave., *Peoria, Ill.*
1920-22 Chestnut St., *Philadelphia, Pa.*
404 Craig St., *Pittsburgh, Pa.*
1015 N. W. Glisan St., *Portland, Ore.*
29 Franklin Road, *Roanoke, Va.*
205 St. Paul St., *Rochester, N. Y.*
3414-28 Lindell Blvd., *St. Louis, Mo.*
2446 University Ave., *St. Paul, Minn.*
579 W. 2nd South St., *Salt Lake City, Utah*
301 S. Flores St., *San Antonio, Texas*
300 West Lake North, *Seattle, Wash.*
806 Pierce St., *Sioux City, Iowa*
320 Riverside St., *Spokane, Wash.*
351-57 E. Onondaga St., *Syracuse, N. Y.*
102 E. Lafayette St., *Tampa, Fla.*
146-48 N. Market St., *Wichita, Kansas*
(Also Toronto, Canada)

GENUINE FRIGIDAIRE PRECISION-BUILT PARTS

Free!

DESCRIPTIVE BOOKLET MAIL COUPON TODAY!

FRIGIDAIRE Service Parts Distributor

(Check list above for location of *your* Frigidaire Distributor)

Gentlemen: Please send me your Free Descriptive Booklet with full details, including prices, of the new Frigidaire Precision Built Modulex Expansion Valve. I understand there is no obligation.

Name .....

Firm .....

Street Address.....

City and State.....

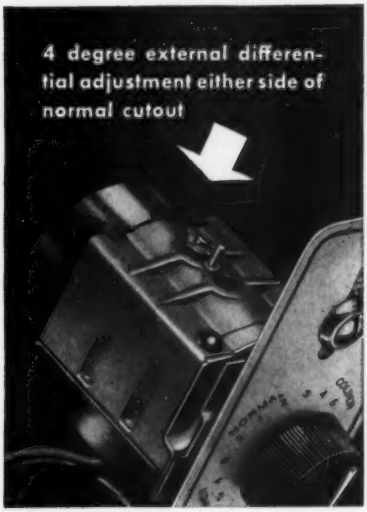
Ontario Maple Leaf Chapter Holds Successful 2nd Annual Exhibition and Convention

ALTHOUGH Canada, in the immediate vicinity of Toronto, was experiencing one of its severest blizzards in recent years, this condition did not seriously affect attendance, nor in any manner detract from the highly interesting and educational exhibit which comprised the 2nd Annual Canadian Refrigeration Convention and Exhibition. There were many more who planned to attend which would have materially increased the attendance over last year, but at the last moment found roads impassable.

On Sunday, March 16th, the exhibits were well on the way to completion and all was in readiness on Monday, March 17th when the convention opened at the King Edward Hotel in Toronto. Some thirty-three exhibitors occupied forty-two exhibit spaces, presenting a diversified display of equipment, accessories and supplies consisting primarily of the products of Canadian manufacturers as well as distributors and wholesalers for many of the products manufctured in the States.

A FEW OF THE EXHIBITS AT 2ND ANNUAL CANADIAN CONVENTION

"THIS IS THE BEST IDEA OUR BUSINESS HAS HAD IN YEARS!"



No single improvement in the replacement refrigeration control field means as much to the service man as the *new external* differential adjustment provided on the improved Cutler-Hammer Single-Button Replacement Refrigeration Control. It permits you to adjust the control for the proper differential for each individual installation with a twist of the wrist. No delays...no return calls...no need to carry a variety of controls to each job.

Cutler-Hammer's *outside range adjustment* enables you to make range settings on the job. And the compactness of the Cutler-Hammer replacement unit, its accessories, and its adjustable mounting bracket mean that here is a *single* unit which will meet 90% of your single-button replacement needs. You need not depend on factory-adjusted control to meet individual needs...you need not carry four or five items in stock for each type of installation. You can concentrate on this single control and enjoy extraordinarily rapid turnover, increased profits...and also reduce customers' complaints. Yet Cutler-Hammer costs no more. *Lists* at $6.00. Write immediately for further details. CUTLER-HAMMER, Inc., *Pioneer Electrical Manufacturers*, 1363 St. Paul Avenue, Milwaukee, Wisconsin.

Adjustable Mounting Brackets
Maximum Mounting Centers 4 3/16
Minimum Mounting Centers 2 3/16

✓ **Adjustable Cutout Feature**—Differential can be increased 4 degrees by turning indicator in "HI" direction and decreased 4 degrees by turning in "Lo" direction.

✓ **Adjustable Range**—Turning countersunk screw clockwise lowers settings and counter-clockwise raises settings.

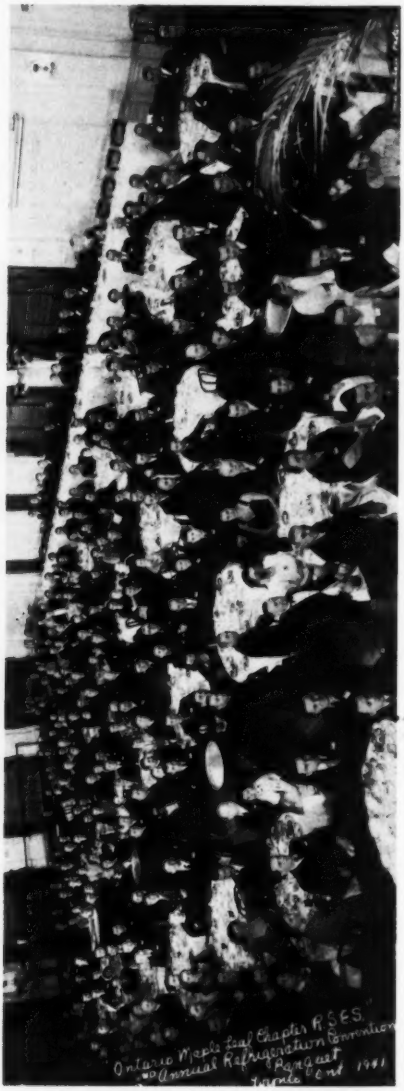
Handles 90% of Your Single-Button Replacement Needs

MODERN REFRIGERATION CONTROL

CUTLER-HAMMER
MOTOR CONTROL
C-H

Monday Morning

The convention was called to order by President Kenneth Wood of the Ontario Maple Leaf Chapter, who, in his own inimitable way, introduced many visitors and explained briefly the object of the meeting in providing an annual event whereby Canadian service engineers and distributors would have the opportunity of seeing some of the latest developments in the field of refrigeration and participating in an intensive two-day educational session.



The second annual banquet sponsored by the Ontario Maple Leaf Chapter. 330 were in attendance.

William Marshall was introduced by President Wood as the individual responsible for the educational program and who would introduce the speakers.

R. J. Thompson of Kinetic Chemicals, Wilmington, Del., spoke on the "Properties and Characteristics of Refrigerants" and supplemented his talk with an interesting demonstration of Freon similar to that given at the annual R.S.E.S. convention in Chicago.

Gordon Burns, Past President of International Society and Ken Wood, President of Ontario Maple Leaf Chapter.

J. J. Goodwin, of Temprite Products, Incorporated, Detroit, Michigan, discussed the subject of "Beverage and Water Cooling" and provided many helpful pointers on the various factors which the service engineer must consider in estimating installations.

Following this discussion the convention recessed and the exhibitors enjoyed a complimentary luncheon provided by the association.

Monday Afternoon

Reconvening, Paul Penn of the Penn Switch Company, with the newly developed demonstration board provided an interesting hour on the subject of water valves and Penn controls. The enlarged working models on the demonstration board illustrated certain conditions which might be met in the field

GROUPS AND PERSONALITIES AT THE CANADIAN CONVENTION

Among those responsible for the success of the convention are the committee members shown in the top left picture. They are left to right: G. Burns, A. Smith, J. R. Potts, H. Parrish, K. Wood, B. Nye, W. Marshall, T. W. Savill.

The bottom picture is a view of the speakers platform during one of the educational sessions. Those appearing in the picture are: R. J. Thompson, J. J. Goodwin, H. Parrish, Paul Penn, Paul Domke, and Ron Jones.

THE SOLDERING CONTEST HELD DURING CANADIAN CONVENTION

(1) Front row: Contestants E. A. Smith, Winner; H. W. Woods, and C. A. Kirkwood. Background: Gordon Burns, Judge and Paul Domke, Mueller Brass Co.

(2) Contestants: C. G. Pinke, Hilton Arthur and Frank H. Tunney.

and the method described to secure the best operating results.

The subject of "Dryer and Drying Agents," which is always an interesting one where service engineers gather, was assigned to P. Domke, of the Mueller Brass Company, Port Huron, Michigan. In his usual thorough manner, Mr. Domke covered his subject quite completely in the time allotted to him and stated that too often an inexpensive investment in accessories when the installation is made would save considerable grief later. Such items as liquid indicators, strainers and efficient dehydrators sometimes made the difference between a satisfactory and unsatisfactory installation.

Information Please

One of the interesting features of the Annual Convention is the "Information Please" program at the conclusion of each day's session. No questions are asked to interrupt the speaker, but at the conclusion of the day's program the speakers serve as a "board of strategy" and any question on the papers presented are deposited in the "Question Box" in advance of this part of the program. For Monday's session, the "board of strategy" consisted of R. J. Thompson, J. J. Goodwin, Paul Penn, P. Domke and C. R. Jones, president of Canadian Capital Chapter of Ottawa.

Harry Parish of Kelvinator of Canada, London, Ontario, acted as the chairman of the portion of the meeting, assigning the questions to the various speakers. His efficient method and knowledge of refrigeration contributed largely to the success of this interesting feature.

Monday Evening

One of the interesting highlights of the Convention was the soldering contest held on Monday evening and sponsored by the Mueller Brass Company, Port Huron, Michigan, under the supervision of Mr. George Allen, Sales Manager, and Mr. Paul Domke.

The contest not only created considerable interest for the contestants, but was equally enjoyed by the spectators. It provided a means of demonstrating the skill of the contestants in the soldering of fittings. The project which they completed was thoroughly inspected and tested by the judges.

The contestants included the following: C. G. Pinke, Ottawa; Hilton Arthur, Ottawa; Frank H. Tunney, Toronto; V. K. Skinner, Port Credit, Ontario; Albert Wright, Toronto; Geo. A. Cumin, Toronto; S. V. Persson, Toronto; Chas. A. Kirkwood, Toronto; Percy Shoemaker, Kitchener; Alan Kay, Toronto; E. Arden Smith, Kingston; H. W. Woods, Guelph; W. A. Horton, Toronto; Robert H. Hunt, Brantford, and Jack McGurn, Guelph.

Tuesday Morning

On Tuesday morning a short session of the Interprovincial Association was called to order by President George H. Huffer, who had previously appointed a committee rep-

resenting members of the various Canadian chapters to make recommendation for the Interprovincial officers during the coming year.

The committee, among other things, made some very constructive suggestions proposing the following officers for the succeeding year. President L. J. Boucher, Montreal, Canada; First Vice-president, John A. Ireland, Belleville, Ontario; Second Vice-president, S. Kilmer, London, Ontario; Secretary, A. W. Dancey, Gardenvale, Quebec; Treasurer, Clifford G. Pinke, Ottawa, Ontario. The report was accepted unanimously.

"Dole Plates and Their Application" was the subject of the first paper on Tuesday morning by A. F. Sawyer of the Dole Refrigerating Company of Chicago, Illinois. This paper appears in this issue.

R. E. Townsend, of the New York office of the Detroit Lubricator Company, gave a most interesting talk on the "Historical Background of Mechanical Refrigeration." Supplementing Mr. Townsend's talk were two large displays of old advertisements, bill heads, photographs and catalogs of the early days of refrigeration when a good portion of the country was dependent upon the harvesting of natural ice for refrigeration purposes. One of the features of Mr. Townsend's talk was a brief prediction of some well-known engineers as to the trend of refrigeration equipment design in the future. Such predictions included the suggestion that a chemical unit for dehydration obviating the necessity for refrigeration would be an important factor in air conditioning application; also that a unit which might be likened to an enlarged solenoid valve would make its appearance for domestic refrigeration and, of course, it was to be expected that domestic refrigerators would, in a very short time, make predominant use of plastics in their construction. Mr. Townsend also stated that many engineers believe the use of air conditioning may provide entirely new developments in metallurgy.

Tuesday Afternoon

K. M. Newcum, of the Superior Valve and Fittings Company, based his talk on a working refrigeration cycle so as to demonstrate the value of heat interchangers and their applications. With the operating display, Mr. Newcum made it possible to secure a number of actual examples and thus show visually how the interchanger would function.

G. E. Graff, Sales Manager for Ranco, Incorporated, Columbus, Ohio, presented a paper on service salesmanship intended to provide some practical pointers on selling for the service engineer. This paper is printed on another page of this issue.

As on the previous day, the "Information Please" program was in the hands of Harry Parish, whose board for this session included A. F. Sawyer, R. E. Townsend, K. M. Newcum and G. E. Graff.

Concluding the educational program, the pictures of the International R.S.E.S. Convention at Chicago were shown.

Tuesday Evening

Climaxing the convention itself was the annual banquet at which a total of 330 were present. The dinner was followed by a floor show and dancing.

* * *

TWIN CITY CHAPTER IN "ANYONE CAN BE AN ACTOR"

MORE than one hundred Refrigeration Service Men, including members of the Twin City Chapter of the Refrigeration Service Engineers Society attended the Spring Party which was held on March 18 at the McQuay, Inc., air conditioning and refrigeration factory and sponsored by Vincent Brass and Copper Company of Minneapolis, Minnesota.

CAST OF "ANYONE CAN BE AN ACTOR" PROGRAM

Reading from left to right: Pat Webster of Station WCCO, Artist Bureau; Lars Berheim, Rex Ashcroft, and Gene Coulter of the Twin City Chapter; and Miss Elizabeth Lindstrom of Vincent Brass & Copper Co.

A buffet Dutch lunch climaxed the evening which was packed full of laughs due mostly to the very clever program in which

MEMBERS OF TWIN CITIES CHAPTER WHICH ATTENDED THE SPRING PARTY

MILE HIGH CHAPTER DINNER-DANCE AND TUBE-BENDING CONTEST

Mile High Chapter held its dinner-dance March 12, at the Loop Cafe in Denver. Dinner was served at 7 p.m., followed by a half-hour of entertainment by a magician. The highlight of the entertainment, however, was the tube-bending demonstration put on by Horace Heffelfinger from Podunk, Colorado.

The picture in the lower right corner tells the story without further explanation.

The tube-bending contest got under way with eight contestants entered. Prizes were provided by Imperial Brass Mfg. Co., Detroit Lubricator Co., Ranco, Inc., James P. Marsh Corp., McCombs Refrigeration Supply Co., Rotary Seal Co., and Frigidaire Division of Denver. Winners in the order in which they were judged are shown in the lower left picture. They are left to right: Front row: Messrs. Trowbridge, Bowman, Tally, Ward and Hooke. Second Row: Messrs. Yonkers, Nelson and Bowers.

Dancing and dance contests occupied the rest of the evening with every one having an enjoyable time. A handsome radio, given as a door prize, was won by L. W. Wendt.

several members of the Society took part.

A conducted tour through the McQuay, Inc., coil manufacturing plant preceded a brief business meeting of the Society, after which Arthur Palen, president of the Twin City Chapter, turned the meeting over to William Hauber of Vincent Brass and Copper Company for a short discussion on refrigeration equipment.

Pat Webster of Station WCCO Artist Bureau, then selected Rex Ashcroft, Gene Coulter and Lars Berheim of the Society and Miss Elizabeth Lindstrom of Vincent Brass and Copper Company for the cast of the very entertaining program "Anyone Can Be an Actor."

The success of the affair was due mainly to the able management of "Bill" Hauber, who also acted as master of ceremonies.

TRI-COUNTY CHAPTER ANNUAL DANCE

TRI-COUNTY CHAPTER extends a cordial invitation to all members of the industry to attend its fourth annual spring dance, to be held at Prager Hall in Aurora, Saturday, May 3.

Dancing, refreshments, and plenty of fun will be the order of the evening, and if past experiences are an indication of what can be expected of this affair, every one will have a most enjoyable evening.

R.S.E.S. Chapter Notes

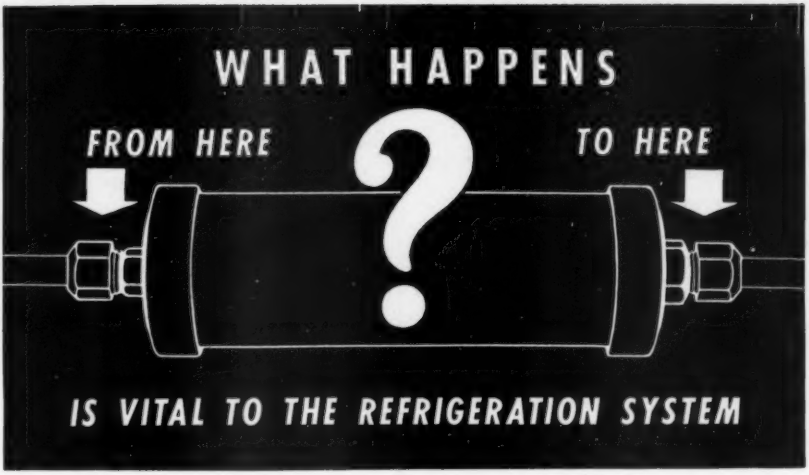
WESTERN MASSACHUSETTS CHAPTER

February 20—The evening was devoted to an entertainment and dance held at the Hotel Bridgeway, Springfield, Mass., at which eighty members and friends of the Chapter enjoyed themselves until a late hour. The most popular item of the entertainment was a magician who did mystic things with fresh eggs, dollar bills, and trained snakes. Acrobatic dancing and popular songs were interspersed with general dancing.

March 26—The regular meeting was combined with a demonstration put on by the Penn Switch Company at the Hotel Sheraton, Springfield, Mass. The attendance included many members of the industries associated with refrigeration service, and a full turnout of the Chapter members. Inasmuch as the controls demonstrated by Penn Switch are used for heating as well as refrigeration, they had a greater appeal to the audience.

ROCKFORD CHAPTER

March 3—Included in the business session of the evening was a financial statement of the receipts and expenditures of a recent dance held by the Chapter. A report was given on the progress made by the



In that spot you station a policeman; a cartridge to remove water and acid from the refrigerant passing through it. Let it fail to do a thorough job and you've a bad case of frozen valves, corrosion and formation of sludge.

Alorco Activated* Alumina makes the best policeman you can have there. No other desiccant has greater capacity for removal of water and acid from liquid refrigerants. You can prove this for yourself, with this simple laboratory test.

Immerse a sample of refrigerant containing only a trace of water in dry ice; you get it down to 110° F. below zero. The moisture shows up as a cloudy, icy slush in the liquid. Now pass that same refrigerant through Alorco Activated Alumina and repeat the test. It remains crystal clear, because every bit of water and acid has been removed.

Ask your supply house for cartridges and dehydrators charged with Alorco Activated Alumina. ALUMINUM COMPANY OF AMERICA (*Sales Agent for* ALUMINUM ORE COMPANY) 2159 Gulf Bldg., Pittsburgh, Pa.

*Registered Trademark

These manufacturers supply dehydrators charged with Activated Alumina:

American Injector Co.
Fedders Mfg. Company
Henry Valve Company
Imperial Brass Mfg. Co.
Kerotest Mfg. Company
McIntire Connector Co.
Mueller Brass Company
Cyrus Shank Company

★ ALORCO ★
ACTIVATED ALUMINA
DRIES REFRIGERANTS DRY

Code Committee in the publication of a booklet covering the code, and the Chapter, at this time, determined the number of books required to be printed.

March 17—A report from the committee in charge of the code book indicated that a proof would be ready for the inspection of the members at the next meeting. The sergeant-at-arms conducted the drawing of the attendance prize, and the name of George Dean was drawn. George, being present, received the sum of $2.40.

TRENTON CHAPTER

February 17—Harry Jaeger, Chairman of the Board of Directors, reported on the last meeting of the Board, at which the tentative slate of new officers was selected. After this slate had been discussed by the Chapter, a motion was made and duly passed that it be accepted and that no further nominations be made. Therefore, the new officers elected are as follows: *President,* George Frie; *Vice-presidents,* Franklyn R. Beemish and William Funkhauser; *Secretary,* Samuel Cohen; *Treasurer,* Albert E. Schweizer; *Sergeant-at-Arms,* Harry F. Teel.

After the election, a motion was made and passed that all past and future presidents be presented with an R.S.E.S. pin with a bar attached showing the date of his term. The meeting was then turned over to Harry Jaeger, who conducted a quiz program consisting of questions from the Chapter's question box.

March 3—The meeting was turned over to Harry Jaeger, Educational Chairman, who introduced Charles R. Logan, of Superior Valve and Fittings Company, the speaker of the evening. Mr. Logan presented his paper entitled, "Selling Your Services," which had previously been presented at the National Convention in Chicago.

Following this, Page Edmunds of the Davison Chemical Corporation demonstrated the uses of Silicia Gel as a drying agent.

March 17—The educational program of the evening consisted of a quiz program conducted by Harry Jaeger, the questions being taken from the question box of the Chapter.

CHICAGO CHAPTER

February 25—Following a brief business session, the meeting was turned over to A. F. Hoesel, Educational Director, who read a paper on dehydrators, describing various dehydrants, their functions and uses.

The meeting was then thrown open for discussion, which brought out many interesting experiences with dehydrators. An informal discussion was then held on the activities of the City Water Bureau in enforcing the City Water Ordinance relating to the installation of refrigeration and air conditioning equipment. Nothing concrete, however, was accomplished from the discussion.

March 11—The meeting was held jointly with the Tri-County Chapter, and the main feature of the evening was the initiating of new members of both chapters. A very short business session was held, after which the meeting was turned over to the initiation team. Under the able direction of George Monjian, the team consisted of Art Hoesel, Paul La Marca, Jerry Jernberg, and Pete Bendl. The entire routine provided considerable merriment and enjoyment for the members in attendance. Following the usual horse-play of such initiations, the serious part of the initiation was conducted by H. T. McDermott, who administered the oath of membership to the candidates.

March 25—Immediately after the business session,

the meeting was turned over to Art Hoesel, Educational Director, who presented a paper on the history and applications of cold plates. The meeting was thrown open for general discussion, and much useful information was derived from it. It developed during this discussion that Ivar Skipple, a past president of the Chapter, had worked on the first cold plate built under the direction of Herman Kliest of the Dole Refrigerating Company. Mr. Skipple presented some interesting facts concerning the origin of the first plate.

LINCOLN CHAPTER

A meeting was recently held to which all refrigeration dealers and service men in the city were invited for first aid demonstrations. Lloyd C. Jenkins, advance first-aid instructor for the American Red Cross, spoke on the hazards connected with mechanical refrigeration and the gases used, including ammonia and sulphur dioxide, and gave the principal points in the rendering of first aid. Mr. Jenkins was assisted in the demonstration by M. F. Egan.

NIAGARA FRONTIER CHAPTER

March 5—A talk on expansion valves and their application drew a large attendance at this meeting of the Chapter, in the Como Restaurant in Buffalo.

The speaker was Frank Carter of the Detroit Lubricator Co. laboratory. Another guest was F. G. Coggin, District Sales Manager of Detroit Lubricator.

President John K. Bush presided. He announced that the Chapter's Board of Directors is studying the coding and licensing problem and may have a report to make later on. President Bush said meetings of the Chapter would be open to all men identified with the refrigeration industry for a few sessions in order to stimulate the Chapter's membership. The next meeting will be held in the Como Restaurant on March 19, when George Franck of the Imperial Brass Manufacturing Company of Chicago will speak.

March 19—The Chapter held its largest meeting of the past year in the Como Restaurant, where nearly 100 members and guests turned out for a double-barreled program that proved to be of tremendous interest to the group.

George Franck of the Imperial Brass Co. discussed dehydrators and dehydration. This was followed by a demonstration of control systems by Michael Parcora and Paul Penn of the Penn Electric Switch Co., who put on an elaborate exhibition with a great variety of equipment.

SAN DIEGO CHAPTER

March 13—The meeting was well attended in spite of a downpour of rain, which lasted most of the evening. There was no special entertainment arranged for the evening, so it was thrown open for an informal round-table discussion on points of interest to the service field. The evening proved to be an enjoyable one with a great deal of exchange of opinion. Every one got into the discussion, and there was much to be learned from the expressions of those in attendance.

It was learned during the meeting that two of the members are now directly connected with defense work as refrigeration service engineers. These two men are employed by a local aircraft concern in the maintenance of air conditioning and refrigeration equipment.

ONTARIO MAPLE LEAF CHAPTER

March 14—Considerable time was spent in the business of the Chapter. Then, the main event, the election of officers got under way. The President, Secretary, and Treasurer presented their reports for the year, all of which showed a healthy growth in the Chapter and a satisfactory increase in the financial standing.

The election was a lively one, with each office being contested individually. However, the final results were as follows: *President*, K. Wood; *1st Vice-President*, J. Marshall; *2d Vice-President*, T. Savill; *Secretary*, A. Smith; *Assistant Secretary*, C. Kirkwood; *Treasurer*, G. Tindall; *Sergeant-at-Arms*, R. O'Connell; *Chairman of the Educational Board*, H. Parish.

PITTSBURGH CHAPTER

March 14—The meeting was held in the Fort Pitt Hotel with A. H. Ross, President, presiding. Announcement was made that the convention pictures would be shown within the next three meetings. The educational feature for the evening was a talk by J. Tracy of the Minneapolis-Honeywell Regulator Company on controls and their applications.

MOUNT ROYAL CHAPTER

January 28—The meeting was opened with the showing of a motion picture entitled, "Imprisoned Freshness," produced by Birdseye Frozen Foods Corporation. The presentation was made by John Raymond of the Hudson Bay Company and was obtained through the cooperation of Gordon Roe.

During the course of the business session which followed, congratulations were extended to Mr. Boucher of the Frigidaire Division, who was elected National Sergeant-at-Arms at the convention held in Chicago.

February 27—M. Turner, Treasurer, reported on the supper dance held by the Chapter recently at the Chez Maurice Club Cabaret. It was considered that the affair was a success, even though a deficit in the financing of the affair was experienced.

On the educational program for the evening, F. Binns of Virginia Smelting Company gave an interesting talk on refrigerants and the methods of manufacturing them. Following this talk, a three-reel technicolor film showing manufacturing methods was presented by Mr. Binns.

VIRGINIA CHAPTER

March 12—The meeting was almost immediately turned over to Paul Domke of the Mueller Brass Company, who presented a demonstration of the products manufactured by his company. After the demonstration, a soldering contest was conducted which provided a great deal of enjoyment and pleasure for the members and guests present. The contest was won by F. J. Magri with a time of seven minutes flat and no penalties.

COLUMBUS CHAPTER

February 13—The ladies joined with the men in this meeting to see two motion pictures entitled "A New World Through Chemistry" and "The Story of Neoprene." The pictures were furnished by E. I. DuPont de Nemours and Company, and were greatly enjoyed by all. Following the pictures, the ladies adjourned to their own meeting, while the men opened their business session.

February 28—The meeting opened with the showing of pictures of the All-Industry Convention at Chicago, followed by a picture of the Tecumseh factory and its manufacturing procedure. This last movie was followed by a talk by Mr. Brandlein, Chieftain distributing agent for the territory.

The greater part of the business session for the evening was devoted to the election of officers. Those elected were: *President,* H. L. Scott; *1st Vice-President,* Bert Sayre; *2d Vice-President,* M. H Tysinger; *Secretary-Treasurer,* P. A. Oberly; *Sergeant-at-Arms,* John Gay.

March 27—A true or false contest with Dr. Slippery Frigidquiz acting as master of ceremonies, occupied the first part of the evening. Many prizes were given out in this contest, and every one enjoyed the information obtained through it.

On the educational program for the evening, Alco Valve Company provided an interesting demonstration of the operation of Alco valves through their glass coil.

ST. LOUIS CHAPTER

February 13—Mr. Gygax informed the meeting that his lecture on the selection of equipment for meat coolers would be completed in time for the next meeting. Messrs. R. White and C. H. Lankford of Century Electric Company were introduced, and Mr. White gave an interesting talk on motor business in London, England, where he had spent several years of actual experience. C. H. Lankford then explained the type of motors manufactured by his company and the rest of the evening was spent in answering questions from the floor.

February 27—On the educational program for the evening, E. Gygax, Educational Chairman, gave the first part of his lecture on the proper size compressor coil and the correct setting of controls for meat coolers. Mr. Gygax has made numerous experiments in his laboratory and has spent considerable time in collecting data for this lecture. He displayed a series of charts and some of the recording instruments that were used in his experiments.

LONE STAR CHAPTER

February 17—President Jack Langston opened the meeting, and after the usual routine of business, a discussion took place on the possibility of changing the meeting place of the Chapter. The Y.W.C.A. has proved inconvenient and unsatisfactory, and after several expressions on the matter, it was agreed that the Chapter would try to obtain Oak Farms Dairy Club Rooms for future meetings.

March 3—A Take-it-or-leave-it program was the main feature of the evening, and the many prizes provided in the contest were donated by the following companies: Jack Booth, Electromotive Corporation, Fedders Manufacturing Co., L. & S. Supply, Jack Langston, Refrigeration Supply, Southern Refrigeration, Kelvinator Corp., Ford Radio Shop, Henry Trotter.

After the contest a two-reel motion picture of 1920 vintage was presented by Mr. Cline. The picture proved to be the hit of the evening, causing a great deal of laughter among the members.

MADISON CHAPTER

February 28—The main purpose of the meeting was to elect a new treasurer, since V. Sweeny was not able to fulfill his term. George Poster was elected in his place. G. A. Larson announced that the mammoth Penn Switch display would be in Madison on April 25 and that members would be invited to see it.

March 13—The meeting was called to order by

President Streich. On the motion of Clarence Buschkopf, plans for the annual Wisconsin state picnic were discussed, and it was decided that something definite should be done in the near future about setting the date.

On the educational program, a discussion on electrical codes and their relation to the refrigeration service business provided much useful information.

TRI-COUNTY CHAPTER

February 7—The attendance prize was drawn by R. C. Marquis. On the educational program Fred Stromeck told the story of the Spertifier and Ultra Violet Ray equipment.

February 21—Harold Anderson won the attendance prize for the evening. The educational program consisted of an interesting discussion on thermostatic expansion valves.

CENTRAL NEW YORK CHAPTER

February 26—President Harder presided over the meeting, which was held in the Polish Community Home clubrooms. A short business session was held and then the meeting was adjourned so that the men could join the ladies auxiliary meeting being held at the home of Mrs. McJury.

March 12—A joint meeting between the men and the ladies auxiliary was called to order by President Harder. A motion was made and carried that the ladies auxiliary meet with the men every other meeting, these meetings to be of a purely educational type.

Upon completion of the business, the meeting was turned over to Mr. Maurice Schwartzberg, who showed five short but interesting educational films.

SPRINGFIELD CHAPTER

February 26—The meeting was held at the home of John Stopplewerth. It was preceded by a pot luck supper.

During the business session of the evening, results of a recent banquet were tabulated in the minutes, and while the affair did not prove to be a financial success, there was no question about its being a social success.

TWIN CITIES CHAPTER

March 4—Among the reports given during the business session was that of the telephone advertising committee. After considerable deliberation on the matter, it was decided that the phone book ad should have the following heading: "A National Organization of Experienced Refrigeration Engineers Protecting the Consumers Against Unethical Practices. We Do It Right." It was felt, in further discussion, that a committee should be appointed to consider a fair price to be used on service charges by all members.

MISSOURI VALLEY CHAPTER

January 2—The greater part of the business session of the evening was spent in the election of officers. Those elected were: *President,* Al Mahan; *Vice-President,* Dan Benash; *Secretary,* Gordon Lozier; *Treasurer,* F. B. Ferguson; *Sergeant-at-Arms,* Richard Plumb; *Educational Chairman,* Elton Lewis.

January 23—The meeting was turned over to the educational chairman, Elton Lewis, who presented Bill White of the Nebraska Power Company. Mr. White gave an interesting talk on engineering problems in connection with air conditioning designs. He also held an informal discussion on designs and

the advantages of many large local air conditioning plants, ranging in size up to 900 tons.

CLEVELAND CHAPTER

February 13—The meeting was opened by President Fenwick, and after some discussion on business matters of the Chapter, the election of officers got under way. The following results are announced: *President*, K. P. Wall; *1st Vice-President*, Ted Metzler; *Secretary*, W. E. Wright; *Treasurer*, K. L. Debes; *Sergeant-at-Arms*, George Baumgardner; *Educational Chairman*, Elmer Weidwold; *Board of Directors*, R. D. Chown, Glen Keller, Emil Flanik, George Schuld, A. M. Fenwick.

On the educational program, Charles M. Metzler gave a much-appreciated talk on the importance of bookkeeping in business. He outlined several methods of keeping records, both for the large and for the small operators. The suggestions he made were of a very helpful nature.

February 27—The entire membership and their wives and friends, totaling 132 in all, made a sightseeing tour through the Cleveland Arena at the invitation of H. P. Bernow. Harvey Bernow explained in detail the construction of the skating floor and the operation of the refrigerating equipment. He also gave the members some insight into the difficulties that would have to be overcome in order to procure and maintain the proper ice surface for the different types of shows that are put on at the Arena. After the inspection trip, the group enjoyed the ice show called, "Icecapades." The evening was a most pleasant one, both for the men and for the ladies.

NEW YORK CHAPTER

February 19—After the minutes of the previous meeting had been read and the correspondence and other routine matters had been taken care of, several discussions arose, among which was one on the possibility of arranging an educational program far enough in advance to be publicized. Another discussion related to the possibility of increasing membership in the Chapter, and ways and means of bringing prospective members to the meetings. Future conventions came in for a good deal of discussion.

LONG BEACH CHAPTER

March 6—After the business of the evening had been completed, the main program consisted of a guessing contest, in which old parts from old makes of refrigerators were exhibited and the guesses made awarded so many points, depending on their accuracy. The winners of the contest were Lyle Eavans, Mr. Eisenbeise, Mr. Murphy, Mr. Crenshaw, and Mr. Winsor, a visitor.

INDIANAPOLIS CHAPTER

The Chapter announces the following recently-elected officers to serve during 1941: *President*, E. W. Wulf; *Vice-President*, J. A. Salter; *Secretary*, John T. Bunton; *Treasurer*, Leon Teetor; *Recording Secretary*, Thomas Driskell; *Sergeant-at-Arms*, O. A. Danniels; *Board of Directors*, Thomas Driskell, Sam Horine, J. A. Cassady, Harold Kleffer.

CENTRAL INDIANA CHAPTER

March 7—After the business had been transacted, William Sevy, with the aid of a blackboard, presented an educational description of the G. E. sealed unit, and Vern Nold gave a demonstration of the action of oil traps.

March 18—Vern Nold gave a detailed report on the arrangements, program, and so forth, for the Chapter party to be held in Marion, Ohio, on April 30. All members and non-members of the Society are invited. Dinner will be served promptly at 7:45 p.m.

Questions had been accumulating in the question box for sometime previous to this meeting and Vern Nold opened it for discussion at this time.

WORCESTER CHAPTER

February 18—A discussion on codes took place, with the codes of the cities of Chicago and St. Louis being used as a basis. Excerpts from these two codes were read, and the meeting was thrown open for discussion so that each member would have a better idea of what these codes contained. It was decided that additional copies of the codes should be made and each member provided with one, so that a more thorough study could be made of them.

Ladies Auxiliary

MISSOURI VALLEY AUXILIARY

February 6—Mrs. Gordon Lozier presided at the meeting, held in the home of Mrs. C. J. Doyle. After the business session, the evening was spent in discussions and work for the Red Cross. A door prize was provided by Mrs. Lozier, and lunch was served after the meeting.

February 20—The evening was spent almost entirely in business matters of the Auxiliary and some Red Cross work. The meeting was adjourned at an early hour and refreshments were served by the hostess.

COLUMBUS AUXILIARY

February 13—The meeting took place in the Chittenden Hotel. Mrs. Creamer gave her report on the proceedings of the 3d Annual Auxiliary Convention. The ladies were invited by the men to see the interesting movie entitled, "A New World Through Chemistry." A new meeting place was arranged for at the Franklin Post, American Legion.

ROCKFORD AUXILIARY

March 3—After the business session had been completed, the meeting was adjourned and the rest of the time was spent in playing Help-Your-Neighbor, with Mrs. Henley winning first, Mrs. McCarthy, second, and Mrs. Overman, low.

March 17—The social events of the evening were devoted to playing Airplane Bunco, with Mrs. McCarthy winning first, Mrs. LaBuddle, second, and Mrs. Overman, low.

ILLINOIS VALLEY AUXILIARY

March 14—After a short business meeting, Bunco was played and the prizes were won by Mrs. Clyde Tobias, Mrs. Dresback, and Mrs. Henry Loercher.

TRI-STATE AUXILIARY

March 11—The meeting was held in the home of Mrs. John Smoot. Some discussion was held on a dinner being planned for the men's chapter at the next meeting, and it was decided that the dinner should be held in the home of Mrs. June Brunton. After the business was disposed of, Mrs. McElhaney read a very interesting story and poem entitled, "Prayer of Faith," by Alexis Carrel. Mrs. Smoot conducted several contests and Bingo occupied a good part of the evening. Refreshments were served after the games.

NEW AUXILIARY CHAPTER FORMED AT NEW YORK

Through the efforts of Mrs. Weldon Andrews, the first meeting of the Central New York Auxiliary was held on February 12. After due consideration, the group voted to form a chapter of the National Auxiliary and elected the following officers: *President,* Mrs. W. Andrews; *Vice-President,* Mrs. I. Thorne; *Secretary,* Mrs. H. Jenda; *Treasurer,* Mrs. J. McJury; *Sergeant-at-Arms,* Mrs. Paul Cross.

February 26—A meeting was held in the home of Mrs. McJury, and was presided over by Mrs. Andrews.

March 12—This was an open social meeting, held at the Polish Community Home, in which both the men and ladies participated. Some discussion took place at this time on plans for the forthcoming banquet which is set for April 19.

AIRO CARTOON-CALENDAR

Refrigeration service and installation contractors are getting a chuckle out of the 1941 Airo Supply Company cartoon calendar "He Tried To Do It Himself."

The novel idea of a cartoon calendar was first introduced by Airo Supply Company four years ago. Each year an entirely new picture has been distributed among servicemen throughout the industry. The calendar has been helpful in impressing customers with the importance of entrusting service work only to skilled refrigeration engineers.

Servicemen may obtain one of these calendars free by writing Airo Supply Company, 2732 N. Ashland Ave., Chicago, Illinois.

C. J. SWAN, DETROIT LUBRICATOR CO., PASSES ON

C. J. SWAN, vice-president in charge of sales for the Detroit Lubricator Co., Detroit, Mich., died on March 23 after a heart attack. He had been identified with the company since 1926, starting as assistant sales manager, advancing to the position he held at the time of his death.

Joseph Holub, Branch Manager of Harry Alter Co.'s west side store in Chicago, as he said goodby to Harry Alter before leaving with the 33d division, Illinois National Guard, Field Artillery, for training in Tennessee.

In addition to Joe, there are six other men from the Alter Co. now in training.

BLYTHE CATALOG READY

BLYTHE'S new 1941 Refrigeration Parts and Supplies Catalog is now ready for distribution and is being mailed to Service Companies and Dealers of the Refrigeration Industry.

On account of unusual market conditions it is expected that there will be more than usual price fluctuations this season and, in some instances, certain products will be more difficult to obtain. The Blythe organization have taken steps to guard against these conditions wherever possible. Larger stocks are on hand to serve the trade and many new items of interest to the refrigeration field appear in this issue.

A division of this new catalog is devoted to listing numerous products which can be sold to the Housewife, the Office, the Motorist, the Sportsman. There are items suitable for gifts, prizes, etc. Nationally known lines

such as Arvin Home and Car Radios, Electric Heaters for the Home and Office, Knapp-Monarch Electric Household Appliances, Taylor Thermometers, Barometers, Humidiguides, etc., Lorraine Automobile Spotlights and Fog Lights, Altimeters and Arvin Car Heaters are some of the items shown. Many of these items are in demand the year around.

Your request for Blythe's new catalog will be promptly taken care of by mailing your letterhead or business card to H. W. Blythe Co., 2334 S. Michigan Ave., Chicago, Ill.

MARLO COIL EXPANDS FACTORY

CONSTRUCTION started March 1 on an addition to the plant of the Marlo Coil Company, manufacturers of refrigeration and air-conditioning equipment, 6135 Manchester avenue, St. Louis, Mo.

On a one and one-half-acre site, the Marlo plant's first unit was erected in 1931. Second unit, doubling the capacity of the original plant, was completed in 1937. The unit now about to be erected will provide four times the original capacity. Ultimate expansion planned for a later date will provide eight times original capacity.

The Marlo Company is headed by A. T. Marlo, C. D. Marlo and L. C. Pellegrini.

DALLAS BRANCH OPENED BY GENERAL CONTROLS CO.

FURTHERING its expansion program, General Controls Co., of Glendale, California, announces the establishment of a direct factory branch office at 1100 Cadiz Street, Room 202 at Dallas, Texas.

In charge of the newly opened branch is Robert C. Allen, sales engineer. Allen is a native of Fort Worth and has lived in Houston and Dallas for many years. He attended the University of Texas. Previous to his association with General Controls he was connected with the Western Auto Stores, Houston Warehouse Division.

The establishment of this branch enables

General Controls to carry complete stocks of its automatic temperature, pressure and flow controls in Dallas and, in conjunction with its Houston branch, to serve directly its increasing Texas business.

S S S

WINNERS OF MARSH CONTEST

THE Judges have announced the names of the winners in the contest held at the Third All-Industry Refrigeration and Air Conditioning Exposition for the purpose of obtaining a name and suggested uses for the new Marsh Charging and Testing Outfit.

First prize was awarded for the name "SERVICE-MASTER" and the best uses to Rial Kellogg of Lansing, Michigan; second prize to George R. Klahn of Minneapolis, Minn. Five additional prizes were awarded to: William E. Anglin of Lansing, Mich.; Edward J. Dettling of Chicago, Ill.; Irving Silver of Nashville, Tenn.; G. A. Post of Indianapolis, Ind., and C. W. Kamm of Toledo, Ohio.

Classified Ads

Rate: Two Dollars for fifty words or less. 30 cts. for each additional ten words or less.

FOR SALE
500 FRIGIDAIRE COMPRESSOR UNITS

complete, in 30"x30"x14" angle iron frame, with monel metal top. Includes ½-h.p. Frigidaire compressor body, fly wheel, valves, condenser coils, receiver tank, and control. In good running condition. While they last—$10.00 each less motor, f.o.b. Chicago. Lang and Epstein, 1140 W. Lake St., Chicago, Ill.

FOR SALE—Take over an established refrigeration service business in Ohio city of 35,000. All the work a Service Engineer and helper can handle year 'round. Selling price covers only real estate consisting of a combined shop and home and inventory of parts and tools. Only $1,500 cash required. Balance monthly. Will stand closest investigation. Excellent reason for selling. For complete information address reply with references to Box 110, THE REFRIGERATION SERVICE ENGINEER, 435 N. Waller Ave., Chicago, Ill.

BOOKS FOR SALE—Write to Nickerson & Collins Co. for a complete list of books on Air Conditioning, Refrigeration, Ice Making, Cold Storage, Food Handling, Heating, Diesel, Oil, and Steam Engines, Domestic and Small Commercial Machines, and others. These are the best books published today on Refrigeration and related subjects. Nickerson & Collins Co., 435 N. Waller Ave., Chicago, Ill.